Scientific American.

THE ADVOCATE OF INDUSTRY, AND JOURNAL OF SCIENTIFIC, MECHANICAL, AND OTHER IMPROVEMENTS

VOLUME XII. NEW-YORK, APRIL 4, 1857. NUMBER 30.

THE
Scientific American,

PUBLISHED WEEKLY

At 128 Fulton street, N. Y. (Sun Buildings.)
BY MUNN & CO.

O. D. MUNN, S. H. WALES, A. E. BEACH.

Responsible Agents may also be found in all the principal cities and towns in the United States.

Sampson Low, Son & Co., the American Booksellers 47 Ludgate Hill, London, Eng., are the English Agents to receive subscriptions for the Scientific American.

Single copies of the paper are on sale at the office of publication and at all the periodical stores in this city, Brooklyn, and Jersey City.

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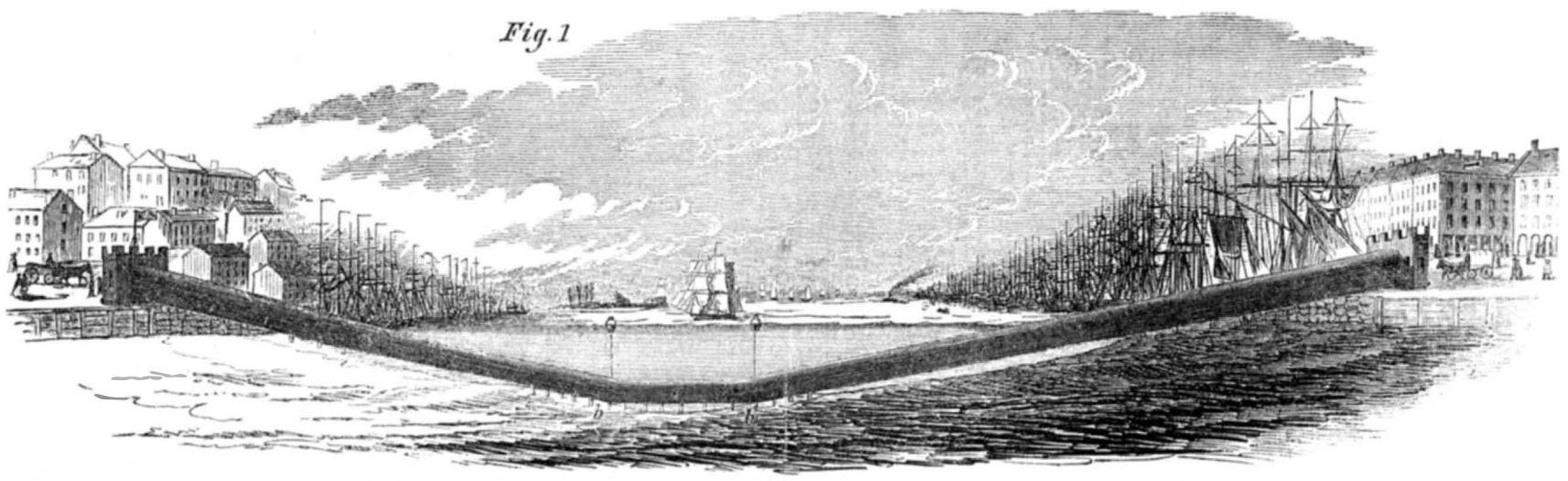
SENDZIMIR'S SUBMARINE THOROUGHFARE.

Every city has peculiarities, but the separation of parts of a city, or of a city and important portions of its suburbs by navigable streams which it is necessary to keep as free as possible from obstructions, is a difficulty not confined to this locality. Pittsburg connects her suburbs on both sides by bridges sufficiently elevated to allow the passage of the steamers of the Monongahela and the Alleghany, and similar schemes have been proposed for connecting New York to the immensely populous city of Brooklyn. The difficulty is the same in kind, and only greater in degree. The magnificent suspension bridges of Pittsburg require to be but moderately elevated, while the narrow strait which we term the East River, must necessarily be sufficiently high to allow the passage under it of the largest steamers ever constructed, and even of the most gigantic sailing ships. The difficulty of elevating the bridge is not so great as that of constructing the approaches. On the Brooklyn side, the elevation of the land at the Hights would remove the difficulty almost entirely, but however it might be arranged, it would evidently require a long and toilsome ascent to gain its level from this side of the river.

The ferry boats now in service allow of very rapid, frequent, and cheap communication; and it certainly is easier to be paddled five minutes on a strong, swift steamer than to walk the half mile either across a bridge or through a tunnel. But the ferry boats are subject to two great difficulties; in fact, the thousands, perhaps myriads, who necessarily employ them daily in traveling between their business and their homes, are subject to three annoyances, which would be overcome by any

Fig. 1



means of land travel; but the third is insignificant compared with the first two. To enumerate them in the order of their importance, the first is due to the ice in winter, the second to fogs and thick weather, snow storms, &c., (some form of which is liable to occur at all seasons,) and the third to the infrequency of the trips at late hours of the night. Ice has, on several occasions, interrupted the communication entirely for several days, and

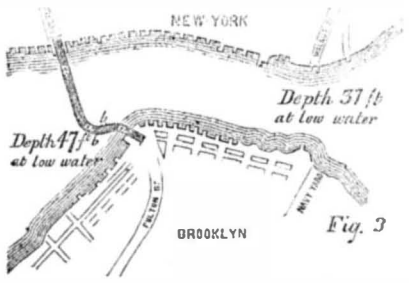


Fig. 3

fogs are very frequently the means of prolonging the voyages to the extent of nearly an hour—a serious loss when the value of the time to an individual is multiplied by the number on the boat, and also by the perhaps greater number waiting at the slips for her return.

Mr. Joseph de Sendzimir, of South Oyster Bay, Long Island, has investigated the question with considerable ease, taking into account not only the points we have alluded to, but also the expense of the various constructions, and the necessarily great obstruction the bridge approach would cause to business, by destroying the streets in the vicinity. As a result of the whole, he has developed a scheme represented in the accompanying engravings:—

He suggests an iron tube of the form represented by fig. 1, *a a*, having its central

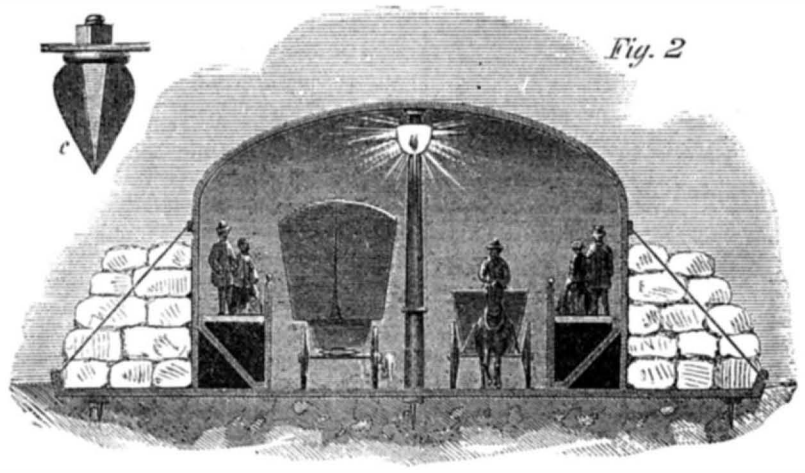


Fig. 2

portion, *b b*, sunk in the deepest part of the channel, whilst its bends, *b b*, would rest on the ascending bed of the river. From the bends, *b b*, the tube would take an ascending direction, and at the same time at an obtuse angle with the borders of the river to insure as gentle a slope as possible, (see both figs. 1 and 3,) and be thus carried to the level of the streets abutting its termini.

As in this project neither pier buildings, nor excavations, &c., &c., would be necessary, all or rather nearly all outlay would be comprised in the construction of the iron tubes, which, to use the language of the inventor, may be built at any convenient point on boats, and when nearly the whole length is completed, may be made to float by closing the extremities water tight, and then floated to the place appointed for the thoroughfare; and ultimately, that portion of the tube sunk which is destined to remain under water, by introducing the proper ballast into the interior, and on the platforms outside, thus forming a submarine tubular thoroughfare. The remaining part of the tube, with the et ceteras, to be completed afterwards.

At the first glance this tubular thoroughfare seemed to me to be likely to obstruct the free passage of the tides; but taking into account that the tube stretches where the river is wider and deeper than a little further up, where its breadth is reduced to one third, and its depth at low water to only thirty-seven feet, such an apprehension would probably prove to be groundless."

Letters Carried by the Mails.

The post office system was a great invention, cheapening the postage was a great improvement, and the introduction of the money-order system, or some other which will allow us to send money by mail without risk, will make postal facilities quite satisfactory, much as we are liable to complain about occasional delays. An idea of the numbers of letters now sent in the United States may be inferred from the fact that 150,000,000 of stamps were sold during 1856, being an average of about six to each man, woman, and child. It is probable that individuals old enough to read and write, send and receive on an average about one letter each month.

Caution.

Inventors who write to us for information in regard to their improvements, should always state, at the beginning, for what particular purpose the invention is intended. As for instance, "Improvements in Safety Gages," "Improvements in Feed Motion for Saw Mills," etc. The observance of this simple rule will many times save us considerable trouble in finding out upon what particular device information is solicited.

Action of Light on Muscular Fiber.

M. Brown Sequard has recently read a paper before the Royal Society (London.) on the above subject. The renowned Haller, in his writings, stated that he had witnessed the action of light on muscular fiber without nerves, but later anatomists repudiated such an idea. M. Sequard, however, by some careful experiments, has resuscitated Haller's views. He asserts that muscular fiber—the iris of the eye, for example—is affected by light independent of the reflex action of the nerves. The iris of an eel showed itself susceptible of excitement by light, after the eye had been removed for sixteen days from the creature's head. These effects are stated to be produced by the illuminating or yellow rays alone, and that the chemical (blue) and the caloric (red) rays always remain neutral.

Somebody has been examining into the nature of lightning, we mean the nature of the light therefrom. It is well known that reflected light differs from direct light in possessing a quality termed polarization. But this experimenter, M. Liais, finds that this light even when apparently reflected from a cloud is not polarized, but when reflected from the air it is polarized like other light. He also could find no trace of polarization in the fugitive gleams which are called "heat lightning."

A stratum of carbonate of soda, sixty miles long and several feet in thickness, has been discovered in the mountains of Pernambuco near Ipu.

The Zodical Light.

M. Von Humboldt has written to the Astronomical Society of Berlin on certain appearances connected with the zodical light, drawing attention to new facts connected with that phenomena, from which it appears that this remarkable light is not confined to the west, as was supposed, but has been seen by himself and others in the east, at the same time. The conclusion drawn from the various observations made in regard to this phenomena is, that the earth is surrounded by a nebulous ring lying within the moon's orbit, confirming the views of Rev. G. Jones, Chaplain U. S. Navy, fully described in the "Annual of Scientific Discovery" for 1856.

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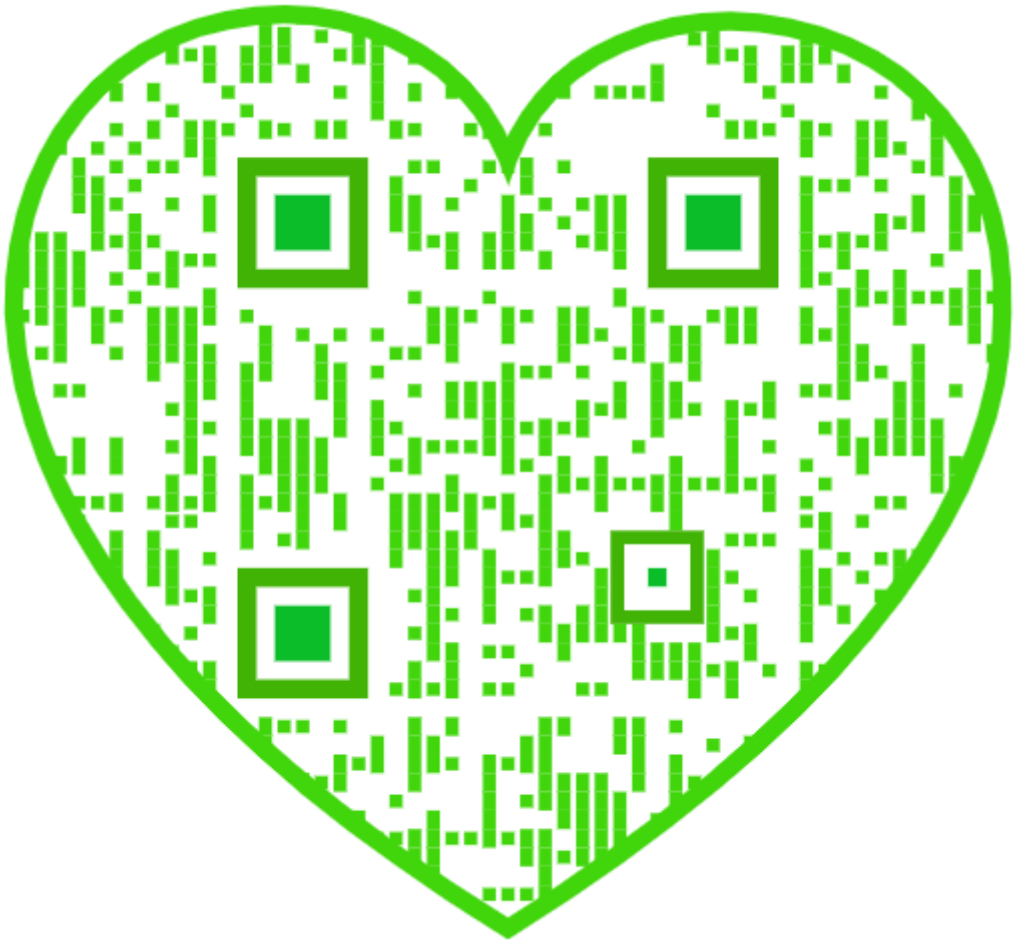

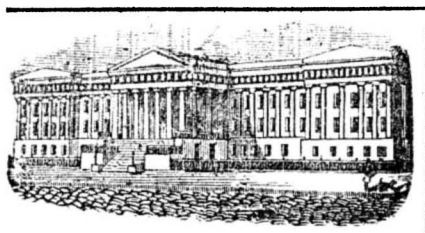

[Reported officially for the Scientific American.]

LIST OF PATENT CLAIMS

Issued from the United States Patent Office

FOR THE WEEK ENDING MARCH 24, 1857.

CORDAGE MACHINES—James P. Arnold, of Louisville, Ky.: I do not claim the nose tube with the conical opening, the outer end of which is circular.

Ne ther do I claim the movable jaw of the rotary nippers, arranged with lateral guides, on which it slides in a direct line only from and toward the fixed jaw, and is pressed against the fixed jaw by means of a spring, as I am aware that the nose tube and nippers constructed in this manner are found in the cordage machine of Slaughter & Perry, and also in other machines.

But I claim, first, flattening the outer end of the nose tube, for the purpose described.

Second, the wedge-shaped opening between the face of the upper portion of the jaws of the nippers, as described.

Third, constructing the movable jaw of the rotary nippers so that it can yield in any direction, as described.

CASTING R.R. CAR WHEELS—Norman Aylsworth, of Rochester, N. Y.: I claim the construction, substantially as described, of the partially tubular core, c for the center of railroad car wheels, the tube, T, being formed to within a short distance of the end of the said core, and communicating with the lateral passages, g g.

ROTARY PUMPS—Abel Barker, of Honesdale, Pa.: I claim operating the two valves thereof, by means of independent attachments, which are actuated by cam grooves in the side casings of the pump, when the said valves are made to work in separate chambers, in such a manner that if either valve should get out of order, the said valve and its attachments, and also the side casing on that side of the pump, may be detached from the pump without interfering with the perfect action of the other valve, substantially as set forth.

MANUFACTURING COTTON FLANNEL—A. S. Carleton, of Clinton, Mass: I do not claim weaving a fabric with wo species of fillings, one only of which shows upon each face.

But I claim the described fabric or cotton flannel having a foundation of hard thread, and an extra filling of soft yarn upon one or both sides, from which a nap is raised, as set forth.

LUBRICATING UNDER PRESSURE—Jacob D. Custer of Norristown, Pa.: I claim the vertical revolving cup attached to the vertical revolving cylindrical stem, C C C, the grinding or solid center valve, E, at the bottom, the screw, G, and its grinding or solid center valve F, the handles, I and H, and the stuffing box, B, all so combined as to form a substantially vertical center stop revolving cup, steam chest, and steam cylinder oil cup for steam engines, steam hammers, &c., and using for that purpose brass or any other metal which may be deemed best, substantially as described.

SHIRT STUDS—John P. Derby, of Cavendish, Vt.: I do not claim securing studs to the bosoms of shirts by means of a coil of wire, as this is not new, and forms no part of my present invention.

But I claim widening the wire at its base, for the purpose of preventing the stud from turning in the shirt, as set forth.

Secondly, I claim the offset, f, in the coil, for the purpose of preventing the disengagement and loss of the stud, as set forth.

HARVESTING MACHINES—Geo. Esterly, of Heart Prairie, Wis.: I claim, first, connecting the leading truck to the main frame by means of a rigid reach or secondary frame, H I K, when said reach or frame is pivoted to the rear end of the main frame, and united to the truck by a king bolt, and arranged in relation to the driving wheel, main frame, and platform, substantially as set forth.

I also claim the forked lever, P, lifting piece, N, and spring dogs, g, combined and operating together for lowering the sickle beam, as set forth.

WEATHER STRIPS—J. T. Foster and J. J. Banta, of Jersey City, N. J., and J. H. Banta, of Pierpont, N. Y.: We claim constructing weather strips with diagonal slots taking pins in the door, in such a manner that an endwise motion given to said strip in shutting the door shall cause the weather strip to press onto the sill or casing substantially as and for the purposes specified, it being distinctly understood that we lay no claim to a bar having a similar movement, but actuated by levers, rods or links.

We also claim the manner specified of hanging the vertical weather strip, f, in connection with the upper and lower weather strip, b and e, so that the endwise motion of the latter strips shall force said strip, f, against the vertical door post, as specified.

ROTARY PUMPS—Geo. W. Griswold, of Carbondale, Pa.: I am aware two separate eccentrics with a fixed or stationary partition between them have been used in a pump cylinder; this I do not claim.

But I claim the double eccentrics with their disks or plates formed in one piece, when operating in a drum or cylinder, substantially in the manner and for the purpose set forth.

DOUBLE CARRIAGES IN SAW MILLS—F. B. Kendall of Bath, Me.: I do not claim operating double sets of carriages broadly.

But I claim combining the devices in the manner shown and set forth, for the purposes stated.

CLAMPS FOR BROOMS—Saml. Mason, of Indian Springs, Md.: I claim so uniting the hinged portion of the case to the handle by means of a throng, cord, or wire, as that the leverage of the handle may be used for closing said hinged portion, thus firmly closing the case on the material to hold it rigidly in the case, as set forth, and to strengthen the middle portions of the clasp, as described

RIGGING VESSELS—Geo. F. Trescot, of Charleston, S. C.: I do not claim the dividing the top-sail as in Forbes' or Howe's rig, so as to form a storm sail, but a separate and distinct sail and yard, which I call a storm-yard, and sail on the lower mast, so that in event of a ship losing her top-mast or head of lower-mast, would still have her storm sails to work off a lee shore, and by the division of the shrouds the masts are better secured, though longer, and no more weight aloft than usual.

[This is an invention by which two yards, with what is equivalent to the lower top-sail between them, are carried on the lower mast alone, the shrouds being divided to match, and not to interfere with the bracing up of either yard. It tends to make the lower sail or "course" of less hight than ordinary, and thus to carry the storm top-sail nearer the deck than in either the Forbes, Howe, Linnell or other rigs, and appears admirably adapted to insure the retention of the storm sail in case all the top-mast is carried away. See engravings and description of this rig in No. 2 of the present volume.

BREAKING SLABS OR BLOCKS OF STONE—Ira Merrill, of Shelburne Falls, Mass.: I do not wish to be understood as claiming breaking stone by pressure or percussion, or by both combined, independently of the mechanism employed.

But I claim breaking stone into regular forms by pressure and percussion, when both are applied at the same time to the slab or block of stone to be broken, by means of the mechanism constructed and arranged as set forth.

GRAPPLING AND DREDGING MACHINE.—Augustus Stoner, of Mount Joy, Pa.: I claim the combination of the machine, the supporting and lever shifting cross piece, A, the mitred shovels, D, when combined in the manner set forth, the ring, B, or its equivalent, to sustain the apparatus, and chains, so linked and constructed to operate all the levers simultaneously, and sustaining the cross-piece, A, aforesaid, said combination being substantially in the manner and for the purposes set forth.

MANGLES—R. A. Stratton, of Philadelphia, Pa.: I am aware that rollers have been used for mangling clothes, but heretofore the goods have generally been wound from one roller to another, and pressed between their surfaces after the manner of ordinary calenders. Therefore I do not claim exclusively the use of rollers for mangling clothes.

But I claim the roller, B and B', in combination with the movable roller, D, arranged and driven substantially in the manner set forth, for the purpose of acting upon the roller, K, in such a manner that the cloth on the same may be efficiently mangled without winding it from one roller to another, and for the purpose of removing and replacing the said roller, K, with facility.

SAW MILL DOGS—John A. Taplin, of Fishkill, N. Y.: I claim the double arm rocking dogs, constructed, arranged, and operating in connection with wedges, as and for the purpose set forth, in combination with the traversing carriage, as and for the purpose described.

CARPENTER'S PLANE—M. B. Tidey, of Ithaca, N. Y.: I claim the application to the cavity of the plane stock of a metallic bit case, and so applying it, that its lower extremity shall constitute a part of the plane's face, constructed and operated substantially for the purpose and in the way set forth.

ATTACHING HUBS TO AXLES—J. M. White, of Xenia, Ohio: I claim the combination of the parts marked a b c d e f g h i, arranged as described and for the purposes set forth.

LOCKS—William Whiting, of Roxbury, Mass., and Henry Pickford, of Boston, Mass.: We claim holding the slides in the exact position to which they are raised by the tumblers by the pressure of an elastic cushion or its equivalent, in the manner substantially as set forth.

MAKING NITRIC ACID—Philip O'Reilly, of Providence, R. I.: I claim purifying nitric acid in the manufacture from chlorine and nitrous fumes, substantially in the manner set forth.

[This inventor employs admirable mechanical means for agitating the combustibles in the retort, for the purpose of causing the charge to work earlier, and to prevent the overflow of sulphate of soda into the receiver, and forces steam or hot air through the impure acid in the purifier.]

POCKET LANTERNS—Andrew Ralston, of West Middletown, Pa.: I claim the sliding cap, F, the cap, B, and the wick tube, a, with its two rings or disks, C C, arranged, combined, and operating in the manner set forth and described.

WATER WHEEL—Samuel Reynolds, of Oswego, N. Y.: I claim the radial floats above the horizontal plane, in combination with the buckets or floats below said plane, constructed substantially as described, that is narrowest where they join the radial floats, gradually increasing in width outwardly, and in depth downwards, with an inclination towards the center to their termination, making the outlet to discharge the water deeper towards the center than towards the periphery.

PREPARING FERTILIZERS—Lawrence Reid, of Barren Island, N. Y.: In the patent of Robert Hare, the whole animal is treated, which requires so much acid as to render it too expensive for practice. I confine my action of acid to the liquid portion obtained by boiling or steaming with water.

I do not claim treating the soft parts of animals by concentrated mineral acids and then adding bone dust as absorbents for manure, that having been already done in the patent of Dr. Hare.

But what I claim consists in treating with acid only the liquid parts of the animal matter, after the same has been boiled or treated by high pressure steam, and then treating the same with bone dust and absorbents, in the manner set forth.

CROSS CUT SAWING MACHINE—Stephen Scotton, of Richmond, Ind.: I claim, first, the combination of the saw, o, in swinging frame, O, in combination with the locomotive carriage, A A' B C D E F F G, etc., or equivalents, for the purposes set forth.

Second, I claim the combination of saw, o, and frame, O, with the swinging saw table, U, and sliding bar, V, substantially for the purposes set forth.

Third, I claim saw, O' in horizontal swinging frame P, in combination with the locomotive carriage, A A' B C D E F F G, etc., for purposes set forth.

STEAM BRAKES FOR R.R. CARS—T. E. Sickles, of Kennett Square, Pa.: I am aware that steam brakes have been used by which they are brought into use by the action of steam in forcing them against the car wheels, and also that brakes have been used which were forced against the car wheels by the action of a spring, but the use of a spring or mechanical equivalent bringing the brakes into operation, in combination with the use of steam or other gases for arresting the operation of the brakes is new and original with me.

I do not claim the use of steam for holding the brakes to the wheels of railroad cars, as this has been done.

But I claim the so combining the use of steam, or its equivalent, with the brakes of railroad cars, as that the steam shall hold the brakes from the wheels, and in partial use or disuse, admit a weight or spring to apply said brakes, in a manner substantially as described.

SHIP'S WINDLASS—Norman Smith, of Stonington, Conn.: I do not claim the use of a ratchet to operate a windlass.

But I claim operating the windlass for raising anchors and for other purposes on ship-board by means of a crank or eccentric on the axis of a capstan, F, or other upright shaft, through the medium of pawls, P, attached to levers, L, and working in ratchets, R, on the windlass beam, substantially as described.

REGULATING VELOCITY AND FURLING THE SAILS OF WIND WHEELS—F. W. Witting, of Twelve Mile Coletts, Gin, Texas: I claim connecting the spindles, E, to the sliding rod, F, by means of the part pinions or segments, c, and rack, d, arranged as described. But I disclaim the spindles so arranged as to turn in their hub, and also the weight when not used in connection with the segment and rack.

I further claim furling and unfurling the sails, H, by means of the drums, j k, attached to the rod, F, and the cords, p t, attached to the drums, and sails, as shown and described.

[This is a valuable addition to the already numerous means of making the position of the sails self-adjustable, so as to regulate the velocity, and also of furling or unfurling at pleasure, without stopping.]

CIRCULAR SAWING MACHINE—Geo. F. Woolston, of Washington, D. C.: I claim, first, the application and use of guard plates, substantially in the manner and for the purposes described, in combination with knives or cutters formed in saws or inserted therein, and operating substantially in the manner specified.

Second, I claim, substantially as described, the manner of applying the said plates, holding them firmly and so adjusting them as to prevent vibration of the saw.

REGULATING VELOCITY OF WIND WHEELS.—A. W. Wood, of Milwaukie, Wis.: I claim enclosing the wind wheel, A, within a cylindrical case, B, formed of two rows or series of vertical slats, C D, one row or series of which is placed in a reverse position to the other, and encompassing said case with a gate, G, which may be raised and lowered on said case in any proper manner, the above parts being constructed and arranged substantially as shown and for the purpose of regulating the speed of the wind wheel, as set forth.

SMUT MACHINES—William Zimmerman, of Quincy, Ill.: I do not claim such devices as are represented and described in the patent granted to Howlett & Walker, May 9th, 1846.

But I claim a series of stationary and revolving cylinders, arranged on discs, or their equivalents, from the center outwards, substantially as described, for the purposes set forth.

I wish it distinctly understood, that I disclaim the devices covered by the patent granted to R. M. Dempsey, Dec. 18th, 1849.

RAILROADS—Hiram Carpenter, of New York City, assignor to the American Iron Railway Co.: I am aware a cast iron cross tie, with chairs attached, is not new, nor are cast iron pedestals new; nor is the interposition of an elastic material between the rails and their supports new. All these things have been essayed in some separate form or other, and I do not claim them separately.

I claim, in combination with the tie and pedestals cast in one piece, the chairs so constructed as to fit in or on said pedestals, and to hold the rails without the use of bolts, spikes, or keys, substantially as described.

FEEDING DRILL SHAFT—Geo. C. Taft, of Worcester, Mass., assignor to H. W. Mason, of same place: I claim combining the pawl with the vibrator lever by a secondary lever and spring applied to them, substantially in the manner and for the purpose as specified.

RE-ISSUES

VAULT COVERS—J. B. Cornell, of New York City: Patented originally Feb. 19, 1855: I claim grooving or channeling the upper surfaces of the metallic portions of illuminating covers, substantially in the manner and for the purpose set forth; but this I only claim when the glasses in said grooved covers are so arranged as to bring their upper surfaces flush with or a little above the upper surfaces of said covers, substantially as represented.

SETTING MINERAL TEETH—John Allen, of New York City. Original patent dated Dec. 23, 1851: I claim a new and useful mode and improvement in setting mineral teeth on metallic plates, by means of a fusible mineral compound or cement which is used to fill up the interstices between and around the base of the teeth, and upon the plate, of which a continuous artificial gum without seam or crevice.

DESIGNS.

SODA WATER APPARATUS.—Joseph Bernhard, of Philadelphia, Pa. (assignor to himself, James Hindermeyer and Louis Gansz, of same place.

RADIATOR STOVES—N. S. Vedder, of Troy, N. Y., assignor to Galbraith & Cassell, of Jacksonville, Ill.

COOKING STOVES—N. S. Vedder, of Troy, N. Y., assignor to J. S. & Merrit Peckham, of Utica, N. Y.

Remedial Agents.—Calomel.

We presume that no one will gainsay the assertion, that the powers of very few remedies are well understood, and their uses and effects accurately ascertained by physicians. Indeed, the time, watching, and study required, are so great that exceedingly few trouble themselves to ascertain and learn what should be known of remedies. All that appears to be necessary, in this age of rapid progress is, that such and such remedies are not *poisonous* or *unsafe*, and to assert that others are too fond of *experimenting*. This, as is generally well understood, will satisfy the public, who, by-the-bye, have a mortal dread of poisons, and a great fondness for safe and gentle remedies; and this safety and mildness of remedies will be a sufficient salvo to the consciences of the indolent, ignorant, and time-serving, or mere routinest.

There are at least three different sets or systems of nerves in the human body, and it is through these channels that the action and effects of medicines are manifested, and their powers and proper use or application learned. These are the sensitive and voluntary, the respiratory, and the gangleonic or great sympathetic nerve, or involuntary and comparatively insensitive. The pain and suffering of the patient are usually much greater when the sensitive and voluntary system of nerves and organs are effected, and the danger is much less in proportion to the pain or restlessness manifested, than when the other systems are assailed, and more especially the last-named, where the sympathetic nerve is more particularly distributed. Again, we believe as a general rule, that the most important remedial effects are brought about by a change in the action of the organs or functions controlled by the great sympathetic nerve. In short, we believe that all remedial agents act primarily and directly upon all the organs and functions of the body through the medium of the nerves. As the actions and functions of one system of nerves and organs are different from those of another, it would be idle and out of place to administer a remedy when one system was affected that was adapted to a different set of diseased organs or functions. An agent may, and often does, act on one set of functions when given in a certain quantity and manner, and on a different set of organs and functions when administered in a different quantity and manner.

To illustrate our idea, and the meaning we wish to convey, we will take calomel: By giving calomel in small and repeated doses we obtain the cathartic, irritative, or sensitive effect of that agent; but although we witness the operative effects, such as catharsis, nausea, and ultimately salivation, yet by such a process we obtain but a very slow and indirect remedial effect. The sensitive or cathartic effect of calomel is not primarily remedial; neither is the commonly called test of its full operation upon the system, either directly or indirectly, remedial. . . . .

. . . . . We have given these cases to illustrate our views, as well as to show the varied powers of calomel. Showing, as we believe, that the effects of calomel, namely: catharsis and ptyalism, (purging and salivation,) which have been looked upon as remedial, and as tests that the system has been brought to the fullest extent under its influence, are not so in reality; and further, that its most important remedial powers are often obtained by administering it in large doses, after free purging and ptyalism to a disagreeable extent had been produced.—(Charleston Medical Journal.

Instability of the Earth.

Not far from Naples, near Puzzuoli, there are parts of the ancient temple of the Egyptian god Serapis still standing; three beautiful columns especially speak of its former splendor. At a considerable hight they present the curious sight of being worm eaten; and recent careful researches leave no doubt that the waters of the Mediterranean once covered them so high, as to bring these their upper parts within reach of the sea worms. Since then the land has risen high; but, stranger still, they are, by a mysterious force, once more to be submerged. Already, the floor of the temple is again covered with water, and a century hence new generations of mollusces may dwell in the same abandoned homes of their fathers, which are now beyond the reach of the highest waves.

Artichokes.

The *Tribune* very properly contends that the great value of artichokes has never been understood generally by American farmers. They will produce a thousand bushels per acre with little or no cultivation, upon a moist rich soil, and the roots will keep undug through the winter, or they may be plowed out and fed in the fall, and hogs turned in upon the ground in the spring to root up the small roots, and this gives the land an excellent preparation for any other crop. The same root has been long grown in all the New England States in little patches, for the amusement of the pigs and pleasure of the boys, who are fond of digging and eating it raw in early Spring. Sometimes they are used for pickles, but seldom cooked in the the Northern States, while at the South they make a common dish upon many tables.

Complimentary Notice.

It is seldom we allow ourselves to manifest a show of egotism in our columns, prefering each and all who do business with us, or patronize our paper, to find out for themselves our good points; but the annexed extract from a gentleman whom we know to be a modest man, we cannot refrain from copying:—

"I have been a subscriber to your paper for five years, and here will state a fact, not to flatter, but because it *is* a fact, that your paper has done more than any other one circumstance or influence, through information and advertising, towards giving me a business which will amount this year in the aggregate to between thirty and forty thousand dollars. J. H. J.

Rockton, Ill., March, 1857.

More on the Speed of Mill Stones.

MESSRS. EDITORS—I have had much experience in mill building, and should recommend 180 revolutions per minute, or a velocity of 37·6992 feet per second at the periphery of the stone, and by this rule may be calculated the velocity and revolutions of different sized stones. There is, however, a diversity of opinion on this subject; but those best informed in modern mill-building will, I think, confirm this data, if they do not recommend a still higher velocity. J. L. D.

Atlanta, Ga., March 15, 1857.

Price of Post Office Orders.

We are informed by a correspondent that the price of orders for £2 ($10) or less, is 3*d*. (6 cents); above that amount, 6*d*. (12 cents.) and nothing is transmitted above £5 ($25.) The order is made payable only at the particular post office named therein. The name of the party sending the money is not mentioned in the order itself, but is sent to the postmaster who is to pay it, in a separate letter, and the person presenting the order must give the name of the sender—a thing which a thief or any party obtaining it wrongfully might not always be able to do, so that this serves as a slight safeguard against fraud.

Eight and a half pounds of corn are required to grow one pound of pork. So say agricultural authorities.

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Horse Power of Engines.

MESSRS. EDITORS—There is often a difference between engineers as to the relative power of an engine. And it has often been remarked, by Englishmen especially, that the American-built engines are not the power represented; or that the American horse-power was smaller than the English one. This difference arises from the fact of their using a much larger cylinder, in England, to do a given quantity of work, than is used in this country. Now the question arises, what is an actual horse power, in this country and in England? And the answer is, that they are both alike, *i. e.*, the equivalent of 33,000 lbs. lifted one foot high per minute. The next question is, how do you Americans get so much power, as represented, out of so small a cylinder? Ans. By running with greater velocity and carrying more pressure. It is like two men filling a cart with dirt, one having a large shovel, and the other one, say half the size. Let the one with the large shovel go slow, and take big loads; while the one with the small one goes twice, each time taking half the large one does, and both are the same power, because each does it in the same time, but if a little more strength, or pressure, be added to the small one, then it is actually more power than the large one. We now come to the subject of nominal and actual, or gross horse-power. I am aware that in England, and in this country too, a nominal horse-power has been established, based on from 5 to 7 lbs. pressure per square inch of piston, but this is conflicting, as two lbs. make a great difference, according to the velocity and area of piston. I would now suggest that one lb. pressure multiplied by the area and velocity of piston, and divided by 33,000 be called a nominal horse-power. Then how very easy it is to get the result: for instance, a 60 inch cylinder has an area of 2827·4 cubic inches, and suppose the piston travels 300 feet per minute; then $300 \times 2827{\cdot}4 \div 33{,}000 = 25{\cdot}7$ nominal horse power; then, if the pressure is increased to 30 lbs. mean pressure, how easy it is to multiply 30 by 25·7, and the result will be 771 actual or gross horse power; a simple nominal of this kind is very useful for stationary engines which travel at one speed all the time. I will now increase the velocity to 400 feet per minute, just to show how the velocity varies the nominal, then $400 \times 2827{\cdot}4 \div 33{,}000 = 34{\cdot}27$ nominal horse power, and $34{\cdot}27 \times 30$ lbs. pressure $= 1028{\cdot}10$ thus it will be seen, that an addition of 100 feet per min. with the same pressure, makes the engine 257·10 horse more. I know the utility of this will readily be perceived.

I beg leave to call the attention of engine owners, builders, and engineers, to the importance of a more frequent use of the indicator. It does not cost much—a very good one can be bought for from $75 to $100; in very many plaees it would save its cost in from six months to a year, besides the satisfaction to be derived from it, as it not only shows how the engine is working, but figuratively speaking, turns the engine inside out. Then place an indicator in the hands of the engineer, and request a diagram from him every day, all footed up with the amount of coal burnt per day or week. Then the mystery of an engine using more fuel at one time than at another, will be cleared up.

All engineers would be benefitted by having indicators in their possession, as then they could exchange diagrams with one another; and all questions could be settled directly as regards actual or nominal horse power. The work could then be compared with the amount of fuel consumed, and the best engines adopted; also the best engineers would be employed at fair salaries; for if an engine does not perform the duty required, with a given amount of fuel, there is something wrong, either with the engine or the engineer, and there is a remedy for both of these. J. J. ILLINGWORTH.

Utica, N. Y., 1857.

[Mr. I. is every word right in regard to the value of the indicator, and the importance of investigating far more closely than usual the degree of economy obtained in stationary as well as marine engines. We see no objection to his proposition for an universal standard of nominal horse power, but would prefer that some speed of piston should also be assumed, say 300 feet per minute, as engines are frequently bought and sold under circumstances which renders it impossible to determine the number of revolutions it will make, yet many purchasers will insist on being told what is the horse power of the engine.

The Divining Rod Again.

MESSRS. EDITORS—The divining rod has proved very serviceable to me in indicating springs of water, having now plenty of water where before using the rod I could scarcely get any. I have seen it point to a bunch of keys or a port-monnaie hidden under leaves, and therefore think it very likely that it may also indicate beds of ores, though I have never seen it tried. I cannot work it myself, but one of my family can.

My plantation here is a low, flat island, or rather string of such islands, surrounded by salt water. I have heretofore labored under great difficulty in getting good water even to drink, and on many parts not a drop fit for any domestic purpose could I ever find, until I employed a man to find water for me with a divining rod, and since then I have an abundance of water, not always the softest nor sweetest, but still quite good enough for all my wants. Twenty feet from my old well in my yard, where the water was always brackish, and frequently too salt for any purpose, I now have a well, indicated by the divining rod, where the water is almost always very drinkable, and is supplied by a hole bored by an old 2-inch auger, to which a long iron rod was welded. If this be a humbug, I wish most sincerely that I could be frequently humbugged in a similar way.

ROBERT CHISOLM.

Beaufort, S. C., March, 1857.

Shot Manufacture.

MESSRS. EDITORS—My attention has just been called to an article in the SCIENTIFIC AMERICAN of January 10th last, referring to my method of making "drop shot," by cooling the shot in the process of manufacture by an artificial current of air, the article stating that my plan had proved more expensive than the old high tower arrangement, and closed by saying that "it is, we believe, abandoned." Your error, (I doubt not an unintentional one) does my invention great injustice. The facts are, that my patent for making shot was granted in 1849, and has been in constant daily use ever since, making better shot and larger sizes than any ever before offered in this market; it has reduced the cost of making shot to the consumer more than 50 per cent. It is now turning out, within two minutes walk of your office, about one thousand bags of twenty-five pounds each of shot daily. The building of high shot towers at this period of the world's progress may be a matter of taste or feeling, but the necessity of their construction has been emphatically decided in the negative. DAVID SMITH,

of T. O. LeRoy & Co.

New York, March, 1857.

[We have visited these works since the above was in type, and will describe the process next week.

Patented Articles and the Pedler Laws.

MESSRS. EDITORS—In Pennsylvania and some other States, I believe, a law is in force prohibiting sales in the State, county, &c., by "hawkers, pedlers, petty chapmen, and others," except on the purchase of a license made more or less costly—something to the amount of three hundred dollars.

Does not a Patent Right, guaranteeing as it does in so many words: "the full and exclusive right to use, make, and vend for the purpose of using," secure to the patentee, himself, and through him his duly accredited agent, the unobstructed right to sell his articles anywhere, and in any manner he chooses in the United States, without further licence?

C. PRINCE.

New London, Ct., March 16, 1857.

[The question has been often raised, but we do not recollect any judicial decision thereon. Our private opinion is, that the patentee, or his agent, must conform to the laws of the State by buying a licence. We hold that the word "full," is of little value, and that the "exclusive" right is all that is really guaranteed to him by his patent.

Combined Steam--Wethered System

MESSRS. EDITORS—In answer to your favor of the 17th inst., we would reply that we are without any definite information of what has been done by others with superheated steam. We soon discovered what they all no doubt found out, that superheated steam *alone* would not answer, either for boiling, heating, or for actuating engines.

Experiments made under direction of a committee of the Maryland Institute on the comparative effects of steam, superheated steam and combined steam (Wethered patent) for boiling, show the following results—the pressure on the boiler and quantity of fuel in each case being the same. The work to be done was to boil a large cistern of water, the temperature of the water at starting being the same in all cases:—With steam it took 73 minutes to boil; with superheated steam, 80, and with combined steam, 44. In heating about the same results are produced.

In France, some of the *savans* and also engineers asserted that the additional power we attained was due to the superheated steam alone, maintaining that superheated steam of the same temperature as the combined steam, would produce precisely the same results. We soon showed them their error. Our engine was so arranged that it could be worked with ether steam, surcharged steam, and also combined steam. The experiments were conducted under government commission. Their report was briefly this:—Superheated steam showed an economy of 35 per cent; combined steam, 52.

We wish to call attention to the question: From whence is this new power derived? At one time we assumed that it must be owing to the watery particles mixed or contained in steam, and carried over with it to the point of use. Meeting there the highly heated steam, those particles became converted into "high, dry and elastic steam;" but we are not entirely satisfied with that theory, and look to some other for an elucidation of the cause. May it not be due to the liberation of latent heat? or, is it due to electric agency? The report to the Maryland Institute would favor the former, but does not disprove the other.

The principal advantages of our system are:—

First. A saving of fuel of from 30 to 50 per cent.

Second. Boilers will not require to be so large.

Third. Small quantity of injection water required.

Fourth. A uniform pressure can be more easily mentioned.

Fifth. Less labor required.

Sixth. Steamships can make longer voyages or save the space usually occupied for fuel in short voyages.

Seventh. Smaller cost of boilers, including the cost of our addition.

Eighth. Entire absence from danger.

WETHERED BROTHERS.

Baltimore, March 20, 1857.

Mammoth Cave—The Bottomless Pit.

MESSRS. EDITORS—I see you are troubled occasionally with correspondence relating to an extract from the Philadelphia *Ledger*, in regard to the Bottomless Pit, in the Mammoth Cave of Kentucky. Permit me to state a few facts in regard to it. Having been brought up near this notable cave, I have had the opportunity of exploring to some extent its wonderful avenues. Truly it is a great curiosity. The cave is situated near Green river, and is entered on the side of the knobs. You proceed along one of the branches of the cave until you come to the rock spoken of by the *Ledger*, and as he describes, all is darkness around on three sides, and far below, as far as one can judge from lamp light; but I have passed over this Bottomless Pit on a bridge thrown over it for the purpose, when we proceed on until by a circuitous route we descend to the very bottom of the pit. When you are at the bottom, it presents the appearance of a great dome; you are then standing on the strata, or nearly so, of Green river, a branch of which runs through the cave, and arrests your further progress; but by a small boat they have gone much further in the cave From my observation, I would judge the Bottomless Pit to be from fifty to one hundred feet deep. Not having made an actual measuremeut of it, I merely guess at it, and that by lamp light. No pit could extend below the bed of the river, and the possible hight would depend on the hight of the knobs in which a pit opens up. J. E.

Georgetown, Texas, Feb. 29, 1857.

Contagion and Quarantine.

The well-established fact that the yellow fever—a disease formerly confined to the cities and districts of the far South—has, within a few years, become quite serious in northern sea-port places, makes it probable that the following, condensed from the concluding portion of a long and able article in the Charleston *Medical Review*, may be read with interest. The writer is strongly in favor of a strict quarantine; and in the course of the article, which covers forty-seven pages, gives many facts in support of his assertion, that cleanliness, fumigation, whitewashing, and much ventilation, will not always remove the infection from a vessel, and that cargoes or individuals from an infected port have always preceded the appearance of fever even in Charleston:—

"The annual and apparently spontaneous origin of yellow fever is observed in Havana, but not in New York. The occasional development of the same fever has been observed both in New York and Charleston, under similar circumstances, but certainly not the same circumstances that precede its development in Havana. The possibility is, that in Havana, for want of contingencies, the disease always preserves its diffusive properties, and in New York and Charleston it loses them. The species dies out, and cannot be re-produced, unless we re-plant the seed, which is easily done by bringing a parent plant in full bearing to either city at a genial period of the year. Such re-planting is the arrival of a vessel with a case on board, or even the arrival of a vessel which has had a case on board.

From whatever source obtained, the diffusive powers are the same; and distance within the limits of the populous portions of the city avails little in arresting its progress.—The simultaneous outbreak in many parts at the same time, is proof of this. If local causes alone produced the disease, it would be limited to low and unclean localities. The mere act of extension is proof that all parts are capable of producing the first cause of the disease.

The diffusion of the poison to many, even distant parts, was too evident to admit of dispute, and too similar in its diffusion along the high and healthy region of Staten Island, the shore of Long Island, and the interior of Fort Hamilton and Governor's Island, to admit of any difference in the character and behavior of the disease in the State of South Carolina, and in the State of New York. The introduction of the yellow fever into the garrison on Governor's Island, harbor of New York, is attributed to the arrival of invalid soldiers from the forces in Florida. The illness and death of their comrade at Morris' Island is satisfactory on this point, and shows that the rigorous execution of the quarantine law excluded at least one case from the city; and we have every reason to believe, if it be capable of excluding one source of disease, it is capable of excluding many, and may finally arrive at that state of executive perfection as to exclude all; and when that happy period shall arrive, merchants, as well as citizens, will believe that there is some virtue in well-regulated and vigorously executed quarantine laws; and the forlorn hope of hygienic measures to change the natural character of a disease, will yield to the more salutary and resolute determination to make it a stranger to our homes and our cherished city, by opposing every barrier to its entrance, and every exertion to its exclusion."

On the 24th ult. we paid into the United States Sub-Treasury Office, in this city, fourteen hundred and eight dollars to the credit of the Patent Office Department. Who can say that inventive genius is inert, or that the Patent Office is not a thriving institution under Mr. Mason's Commissionership?

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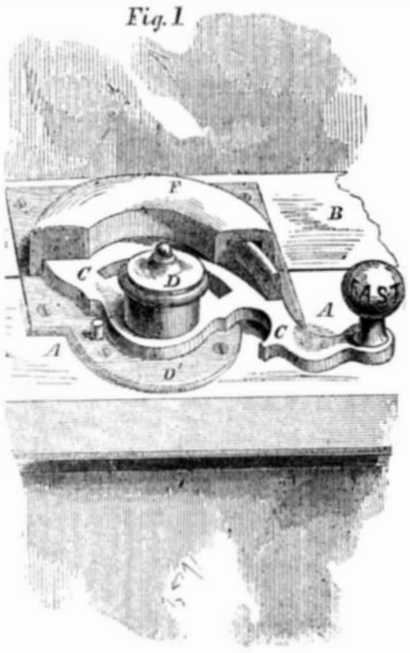
New Inventions.

Broughton's Sash Fastener.

The simple nature and great utility of this invention is worthy of particular remark. By the simple introduction of a spring at the point represented in the accompanying figures, without any materia change either in the form or disposition of he other parts, the ordinary "ring and curtai n" sash fastener is made to act with more ease and certainty when the parts have, as is freq ently the case, become slightly displaced by ne sagging or warping of the sashes or wind w-frame, and is certain to prevent the rattling of the sashes at that point by the wind, a so nd so particularly disagreeable to sick or eak-nerved persons. The introduction of this improvement is due to Mr. John Broughton, formerly of Chicago, Ill., now of this city, who secured a patent therefor on the 27th of January last.

Fig. 1



In the engravings the ordinary ring or partially revolving bolt is represented by C. The socket or curtained channel which it enters on the other sash, is a little wider than usual, but otherwise similar, except in the introduction of the steel spring, E, riveted to the curtain, *h*, as represented, and is free to press with considerable force against C, as it is forced into its place. The spring is strong, and having but little motion is nowise liable

Fig. 2

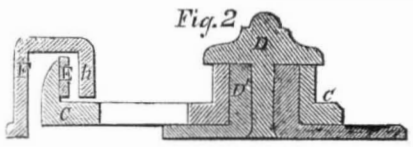
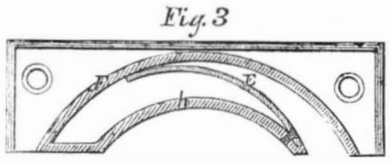


Fig. 3



to derangement, and the fastener operates in every respect similar to the old one, except with superior effect. It is one of those little, obvious, and almost costless improvements which is sure to come into general use.

For further information address Broughton & Fraser, Room 31, N. Y. & N. H. Railroad Freight Depot, corner of Center and Franklin streets, New York.

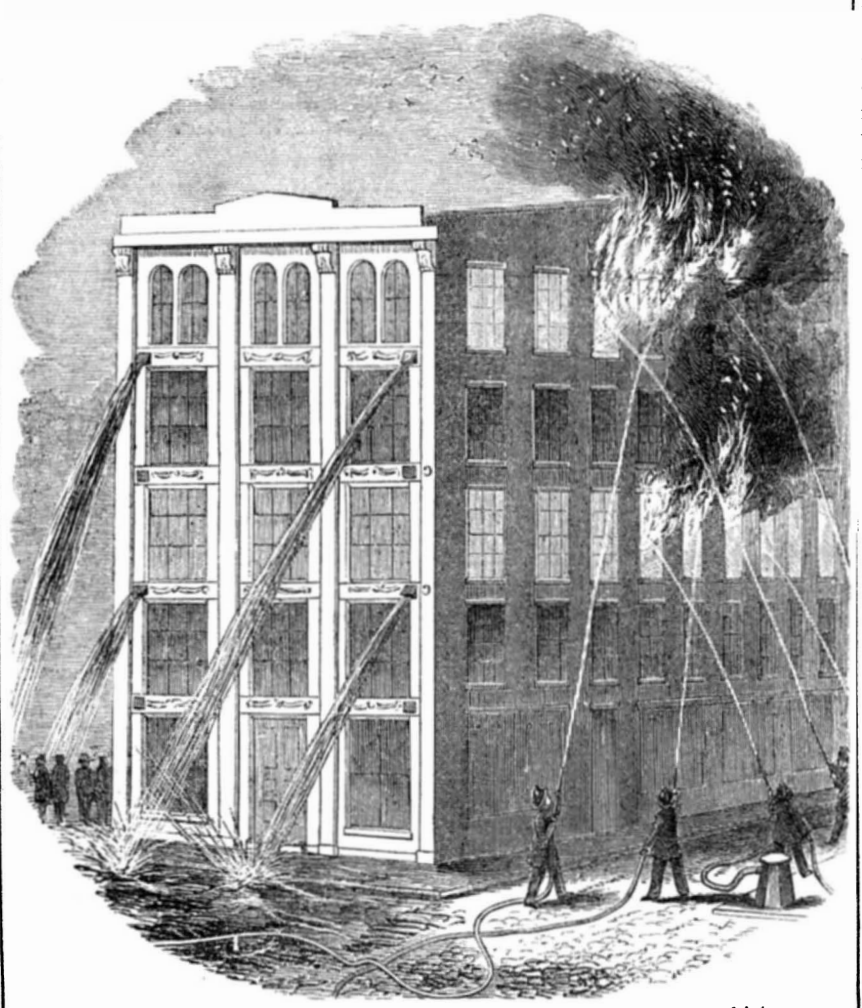
Milk as a Manufacturing Ingredient.

Milk has made its way into the textile factories, and has become a valuable adjunct in the hands of the calico printer and the woolen manufacturer. In the class of pigment printing work, colors are laid on the face of the goods in an insoluble condition, so as to give a full, brilliant appearance. As a vehicle for effecting this process of decoration, the insoluble albumen obtained from eggs was always used, until Mr. Pattison, of Glasgow, Scotland, found a more economical substitute in milk. For this purpose buttermilk is now bought up in large quantities from the farmers, and the desired indissoluble matter is obtained from it at a price far below that of egg albumen. This matter the patentee has called "lactarin."

A second application of the same (milk) has just been developed, by causes arising out of the recent high price of olive oil, which, having risen from $200 to $340 a tun, the woolen manufactories are now using the high-priced article, mixed with milk. This compound is said to answer much better than oil alone, the animal fat contained in the globules of the milk apparently furnishing an element of more powerful effect upon the fibres than the pure vegetable oil *per se*.—*The Cincinnatus.*

The British Parliament has been petitioned to inquire into the merits of Daines' invention for preserving stone work from decay. Sir Charles Barry certifies that 1400 square yards of surface of the new Houses of Parliament has been thus preserved, and after a test of two years presents extremely satisfactory results.

ESTLACK'S WATER ESCAPE.

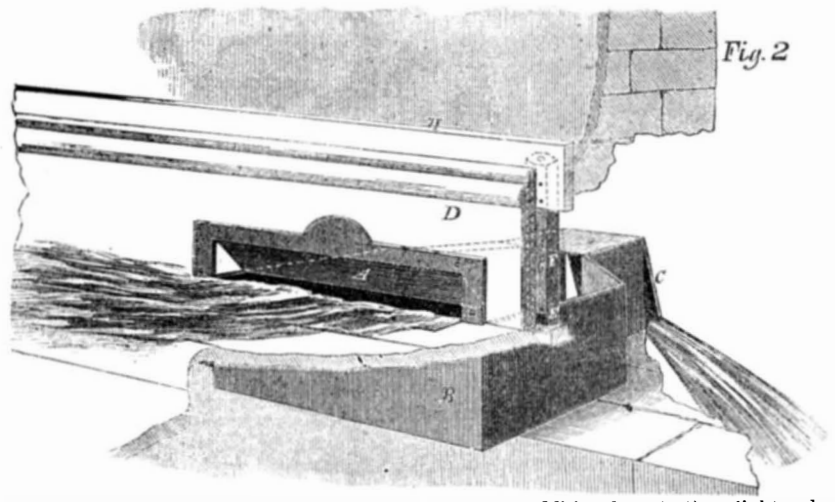


The accompanying engravings represent an invention patented by Mr. Thomas Estlack, of Philadelphia, June 3d, 1856, for preventing damage to goods by water in case of fire in upper stories.

It is frequently the case, when fires occur in wholesale or retail stores, and in warehouses of fine fabrics, that the damage caused by the flow of water from above, upon the goods, is even more serious than that done by the fire itself. The fire being in an upper story, the water is thrown in in great quantities and floods the whole of the stories below. Mr. Estlack's invention obviates this by a harmless self-acting device and one which cannot, by any effect of casualty or neglect which we can foresee, ever becoming imperative.

Fig. 1 represents, in perspective, the external appearance of a building provided with this invention. The only features visible are the small valves represented near the corners, of which those on the third and fifth stories are opened, allowing liberal space for the escape of all the water which can be thrown in by the engines or hydrants. This being represented as a corner building, it is easy to see that similar escapes for the water might be provided along the side also, but most buildings are only susceptible of such drainage on the front and rear, and our artist has shown

Fig. 2



it on the front alone. In constructing a new building it is well to lay the floors on a slight inclination, three inches in one hundred feet is sufficient, but this is not absolutely essential to the success of the invention.

The valves are of copper, about five inches square, hinged at the top so as to be self-adjusting. Gravity compels them to remain shut, except when pressed against by the water, and thus any considerable influx of cold air is stopped at these external valves; but as an additional protection, light valves are also provided at the points where these escape passages connect with the interior of the building, and as a means of ensuring the ready opening of the heavy external valves they are placed at a level considerably lower than the floor, so that a head of water rapidly accumulates to press against them.

Fig. 2 represents in perspective the arrangement of the castings, or to use a nautical term, of these "scuppers" which penetrate the thick masonry of the building. The casting is represented by B, and the reader is supposed to be standing in the interior of the building with the wall partially broken away. A is the light internal valve above referred to, and C is the heavier external valve. D is the surbase or washboard, faced with a neat casting to support the valve A. It can readily be seen that the introduction of this work will in no wise weaken the building.

Fig. 2 also represents another device by the same inventor, which would seem of considerable advantage, either in connection with the invention already described, or to be used alone. Its effect is to prevent the separation of the surbase from the floor in consequence of shrinkage or other fault. In finishing the building, the surbase, D, is secured to the floor, as usual, by its lower edge; but is not nailed to the furring of the wall, the fastenings in this direction being driven into small pieces, G, which are so mounted in vertical channels, E F, that they are free to slide up and down to the greatest extent ever required in practice. The board, H, may be employed, or not, as preferred. When used it is attached to the furring, and any shrinkage of the parts which would otherwise induce the opening of a large crack between the surbase and the floor, (making an hiding-place for vermin, &c.,) will, with this construction, result only in slipping the surbase, D, slightly downward across the board, H. If H is not employed, a similar slipping occurs against the plastering or papering on the wall.

Any further information may be obtained by letter addressed to the inventor, at the corner of Front and Market streets, Philadelphia, or to Mr. I. S. Clough, Superintendent of the Hall of Arts, No. 394 Broadway.

Backlash.

MESSRS. EDITORS—We are running a flour mill machinery as follows:—Engine 4 feet stroke and 15 inch bore; slide valves eccentric cams; cut-off in valves; running with cut-off at three-quarters; motion 44. Fly wheel, 18 feet in diameter; rim weighs 6500; motion of rim 2486·88 feet per minute. Miter wheels (or nearly miter;) the one on main shaft 51 cogs; the one on upright shaft 52 cogs, reducing the motion to 43 2-13 per minute. Spur wheel on upright shaft driving pinions has 125 cogs; pinions have 30 cogs, increasing the motion of the stones (which are 4 1-2 feet diameter) to 179 4-5 per minute. The rim of the stones moves 2540·57 per min. We run two sets of burrs. We are troubled with a heavy back-lash: what is the cause? Does it arise from too small or light fly-wheel? If so, what diameter and weight is necessary? MARTIN TERHUNE.

Swan Mills, Scott Co., Iowa, 1857.

[The engine probably hangs on the center either every time or occasionally, for reasons unknown and which it is not worth while for us to investigate, and allows the stones—each acting as fly-wheels independently—to run ahead a little. A heavy fly-wheel would probably be a complete remedy, but one equally efficient, and possibly no more expensive, would be to change the gearing, and run the engine quicker. Change either your miter wheels or the spur wheels (we would prefer the latter,) so that instead of 44, your fly-wheel will make say 56 revolutions, the speed of the stones remaining the same; this will increase its efficiency as much as would increasing the weight of rim to 10,000 lbs., and will not, like increasing the weight, subject the arms or the center, or any of the wheels or shafts to any increased strain.

This remedy will necessitate either a closer throttling of the engine or a cutting off of the steam at an earlier point in the stroke. The latter is by all means to be preferred. If the construction of your engine makes it possible with any reasonable expense, to cut off at half stroke, and drive the piston at the increased speed we suggest, you will not only overcome the thumping, but will actually consume less steam, the pressure in the boiler remaining the same.

About 20,000 tuns of iron were manufactured in the Lake Superior region last year.

There are now 1419 miles of railroad in operation in Canada—East and West.

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Scientific American.

NEW YORK, APRIL 4, 1857.

Iron Architecture.

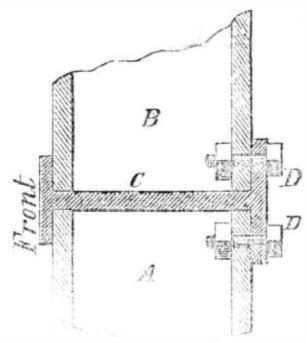
The employment of cast iron for the fronts of buildings in cities has not only rendered cheap and practicable a far greater amount of tasty ornamentation than heretofore; but, singular as the proposition may seem, has actually rendered such architectural display, or some variation in the surface, essential to the obtaining of a proper degree of strength. Economy of material dictates that the actual thickness of an iron wall shall be very moderate, and in some of the first applications of wrought iron to this purpose, the walls, flat, plane, and consequently very weak, were so cracked and distorted by the occurrence of a fire, either without or within, that its use was almost abandoned. Some of the first in California thus failed, but cast iron buildings are so profusely filled with pilasters, cornices, lintels, and various other angular and curved projections and recesses, that the metal has everywhere liberal opportunity to spring, and expand or contract to any required degree, and the leverage of the parts to resist any lateral force is also increased to nearly as great an extent, as if the walls were made solid to that thickness. The practical thickness therefore of the present styles of iron fronts is about eighteen inches, measuring for this purpose from the front of the pilasters and window caps to the recesses of the windows, while the actual thickness of the castings is nowhere intentionally made more than five-eighths of an inch, and many castings are less than three-sixteenths.

The popularity of cast iron for buildings is sufficiently evident, whether we inspect the principal streets of any of our chief cities, or note the activity in the establishments specially devoted to such constructions. Messrs. D. D. Badger & Co. employ over four hundred men—in fact, the number at this moment is actually about 500—and although a part of the work of this concern is the manufacture of iron shutters, more than nine-tenths of this force is engaged in the designing, patterning, moulding, cleaning, finishing, oiling, painting, transporting, and erecting of iron buildings.

We have in this last sentence analyzed the whole construction of an iron front. Some of the processes are obvious enough, but others may need explanation. A professional architect usually works out a design which in some of its features is incapable of production in iron. The first step of the constructor, then, is to alter the design until all the parties are suited. The next is the detail drawing and pattern making, necessarily a large portion of the labor, although as the art advances and stocks of patterns are increased, a larger number of parts will be but duplicates of shapes and sizes before in existence, and therefore require little or none of this labor. Upper stories now generally resemble the lower portions, except that the hight is diminished by sawing off the pattern in the middle, and removing a part, and some of the smaller ornaments, especially the leaves on the Corinthian capitals (Corinthian is a favorite style, by the way, in these buildings) are cast separately, and attached by screws or rivets. The casting is conducted in the usual manner, but the long flasks are mostly of iron, and the metal is poured at as high a heat as practicable, to ensure its filling completely the broad thin cavities. Cleaning the large and "tumbling" the small parts are processes familiar to everybody, as are also the planing and slabbing by machinery, and the more primitive processes of chipping and filing, which to save handling is often allowed to supercede the machine work.

We have just returned from a visit to Messrs. Badger & Co.'s works, which altogether cover twenty-six city lots on Thirteenth and Fourteenth streets. The main shop is 300 feet long by 60 wide, and five stories high. The ground floor where all the heavier parts are finished, has two lines of railroad, (21 inches gage,) extending its whole length, and is studded with cranes to facilitate the handling of the pieces. The drilling and fitting being here completed, each part is oiled and painted. All the small parts are *boiled* in oil, by which we mean immersed in oil at nearly its boiling or rather "frying" point, and allowed to remain in this bath until it has become thoroughly heated. This process is believed to so effectually fill the pores of the metal as to add very materially to its durability. Cast iron is very readily preserved, but the wrought iron screws or rivets oxydise with more avidity; and this heating in linseed oil has been adopted as the best method of defense, and as contributing as far as possible to make iron buildings absolutely unaffected by time. In addition to this oleaginous filling of the pores, the surfaces are painted once in the shop, and again twice after placing in the building before the work is considered finished.

Iron buildings, properly constructed, combine unequalled advantages of ornament, strength, durability, and economy; while they at the same time afford a larger amount of useful interior space in a building of a given size, (an important point in a densely crowded city,) and are tolerably secure against danger from fire, lightning, or an unequal settling of the foundation. The parts are fastened together much more firmly than any mortar or cement has everproved in practice capable of joining stones or brick. Different methods of joining the parts are adopted by builders. One very desirable plan is to join the whole firmly, so that it is in effect a unit, but as this has induced timidity in some, in consequence of the great range such a front would take should it be loosened from the side walls, and fall outwards. Mr. Badger invented and patented a very simple and admirable means by which the front falls, one story at a time, and always inward upon the burning ruins instead of upon the street. This fastening is represented in the accompanying figure, where A represents the top of a lower column, and B the front of a surmounting



one, it being premised that the columnar construction at these points may be apparent or not on the face of the building according to the nature of the design. A lintel, or more properly, perhaps, a "summer," C, separates these castings and is bolted to each by the bolts, D D, *but only on the back side.* As a consequence the joint is free to open on the front side, and allow the upper story to tumble backward only.

Iron buildings are always built by contract. The cost of iron buildings, or, in fact, of any others, varies so greatly that it may appear idle to attempt to estimate the comparative expense. Calculating from the actual contract prices of a number, however, we present a very rough approximation. City lots are usually twenty-five feet wide on the street. A front of this width, five stories high, would cost in this city as follows:—

Wood (forbidden by law) . .	$——
Brick (face brick)	$2500
Brown stone (a kind of sandstone)	$3500
White marble, ...	$4000
Granite, ...	$4000
Iron (elegant style) from	$3000 to $5000

In this article we have confined our attention to the fronts alone. The construction of absolutely fire proof buildings require brick and iron floors, &c., which we cannot now enter upon, but which may or may not be used in what we term iron buildings.

If the lower box in your copper pump sticks fast, throw some hot water on the outside and expand the tube, when it will easily be removed.

The Adriatic.

This mammoth steamship, which was advertised to be put on her route between New York and Liverpool as early as October last, has been lying at the Novelty Works, in this city, where her machinery was constructed, ever since that time, and it would seem that little progress had been made towards her completion, although a large number of men have been kept actively employed. As might be naturally supposed, this state of affairs has induced various reports, and the object of our present article is briefly and distinctly to present the principal facts relating thereto—facts which are familiar to many, but probably not to all of our readers. The *Adriatic* has existed on the books, and in the advertisements of the company ever since its sister ships, the *Atlantic*, *Pacific*, *Arctic* and *Baltic*, were completed. Since the loss of the *Arctic* and *Pacific*, the necessity for more vessels induced the temporary employment of the *Ericsson*, and the commencement to construct the *Adriatic*. This ship is the largest steamship in the world yet afloat. She is not as long as the British iron steamship *Persia*, but is of greater capacity. Her model, although quite full, is beautiful, and believed admirably adapted both for ease of motion in a sea, and for great speed. She was designed and constructed by the lamented George Steers. Her principal dimensions, as compared with others of the largest, and again others of the most familiar steamships, are as follows:—

	Length.	Breadth.	Depth.
Demologos (Fulton's, the first war steamer,) .	156	56	20
Northerner, . . .	205	33	22
Mississippi, . . .	225	40	23
Arctic, ...	286	46	32
Great Britain, . .	289	51	32
Vanderbilt, . . .	335	45	32
Adriatic, . . .	351	49	33
Persia, ...	390	45	32

The engines of this ship are oscillating; the cylinders are one hundred inches in diameter, with a stroke of piston of twelve feet, forming together the most powerful enginery afloat.

The model and construction of the entire hull embraces no very peculiar features. The material is the hardest and most durable wood, and the whole is in the most substantial style of wooden vessels. But in the engine department efforts were made—and as it would now appear very unfortunately—to introduce novelties with the design to economise both in the cost of construction and in working expenses. The ship was fitted with condenser and valves of new form, and embodying new principles. We will endeavor, in a future article, to present sketches illustrating fully the construction of the valves and condensers employed, compared with other styles generally in use. For our present purpose, it will suffice to say that the condenser was a surface condenser, a style in which the cold salt water is kept from mingling directly with the steam, but in all such condensers the heat of the steam is absorbed by the water through necessarily thin metal, and the strongest form of such metal is that of small tubes. Tubular surface condensers have been long in use, but difficulties are almost always experienced from the great contraction and expansion. Mr. H. Allen, chief engineer of the Novelty Works, designed to overcome this expansion by introducing rubber at the ends, but it proved a total failure. The condenser, with various modifications and important revisions, occupied the time of the workmen for several months. In or about the month of December, the condenser was pronounced satisfactory, and the valves became the next subject of difficulty. They act on a principle analagous to stop-cocks, and by their variable expansion and contraction seem determined either to leak or stick; and although a very ingenious and admirable device to release them by moving them endwise the moment the valve is started in its seat, was the original inducement to their adoption, it has so far proved unsuccessful in practice.

Ordinary valves adapted to the mammoth size of her engines are now in progress, as intimated in our last number, to be furnished in case the present should be finally ineffectual. Meanwhile, steam is raised in the boilers every few days, and efforts are actively pushed to test the present devices fully and thoroughly, but the ship has not yet been sufficiently finished to attempt a trial trip. The engines have been worked at the dock for short periods, and this is the most that can be said, as yet, of her actual performance.

Exhibition of the Metropolitan Mechanics' Institute, Washington, D. C.

We have before noticed the opening of the above exhibition, and have now to report the result of a personal visit.

The exhibition building is located on Louisiana ave., at its junction with Pennsylvania avenue, not far from the Branch Office of the Scientific American Agency. The structure is 400 feet long, of wood, erected expressly for the occasion.

The general view on entering the house is imposing. The interior decorations are tasteful, and the arrangement of the articles is excellent. As a whole, the exhibition is a noble one, and indicates a most gratifying state of progress in the industrial and mechanical resources of the country.

Machinery and Motive Power.

The display of moving machinery is good, although not very extensive. The motor is a splendid horizontal steam engine, made by William Ellis & Co., of Washington, D. C. We have seldom seen a more substantial or creditable piece of mechanism.

Corliss & Nightingale, of Providence, R. I., exhibit a large horizontal steam engine, beautifully made and finished, but not in operation. Corliss' improved cut-off is attached.

Hittinger, Cook & Co., of Baltimore, Md., exhibit a portable steam engine in operation, for driving piles. Is well made, looks strong and substantial.

Stave and Barrel Machinery.

Aside from the engines, perhaps, the most conspicuous of the operating mechanism, is the Stave and Barrel Machinery of C. B. Hutchinson, of Auburn, N. Y. This consists of five machines, viz., the stave cutter, the jointer, the crozer, the heading cutter, and the head-turner. It is stated that with these machines, properly attended, 1,000 flour barrels per diem can be prepared ready for setting up by the cooper, at a cost of $22. The same amount of labor, done in the ordinary manner, would cost $125. Price of the machines collectively, $700. See SCIENTIFIC AMERICAN Vol. 10, page 41, for an engraving and description.

Picking Machines.

Richard Kitson, Lowell, Mass., exhibits in operation his improved machines for picking or opening wool, cotton, and all kinds of fibrous materials. The main cylinder is both self-sharpening and self-cleaning. 4,000 lbs. of cotton can be opened per diem. Price of machines, $250.

Agricultural Machines.

John C. Mack, of Watertown, N. Y., exhibits Van Valkenburgh's Patent Grain Separator. The machine is alleged to clean 200 bushels of wheat per hour, completely ridding it of cockle seed, garlic, weeds, and every species of dirt or foreign matter. Price, $150.

Anson Atwood, Troy, N. Y., exhibits his patent portable Band Mill for grinding corn and other grain. Price, $10 to $15, according to size.

G. W. Appleby of Washington, D. C., exhibits Hedge's improved "Little Giant" mill, alleged to be capable of grinding from 15 to 20 bushels of ears per hour. Price, $45.

G. B. Griffin, of Harrisburgh, Pa., exhibits Cummings' hay, straw, and stalk cutter. Said to crush the stalk before cutting.

The Troy (N. Y.) Portable Grain Mill Co. exhibit Felton's portable Grist Mill, noticeable from the admirably small amount of space it occupies, and the fineness with which it grinds the grain. It occupies a space of only 2×3 feet, weighs about 300 lbs., is self-sharpening, grinds from 3 to 8 bushels per hour, according to the power applied, and does not heat the meal. Price, $75.

Ezra Coleman, Philadelphia, Pa., exhibits a very simple, ingenious, and utile portable Grinding Mill. This mill is adapted for grinding corn stalks and cobs for cattle feed in a very rapid and perfect manner, and by a slight adjustment of the grinding surfaces, and the application of a bolting screen, will

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grind corn, wheat, and other grain to any degree of fineness desired, and bolt the same as fast as ground. The grinder is conical in form, and its ribs are different from those of any other grinder, they operate with a cutting action for one half their length, and with a pounding or beating action along their other portion, thus producing superior flour. Price, $75.

Musical Instruments.

Wm. Knabe & Co., of Baltimore, Md., exhibit several splendid samples of Pianos having all the late improvements. In quality and finish they are unsurpassed.

S. D. & H. W. Smith, of Boston, Mass. exhibit some fine Melodeons.

Improved Saw.

C. B. Hutchinson, of Auburn, N. Y., exhibits his improved mode of hanging saws. It consists in having a thin plate directly against the back of the saw, and thus dispensing with fenders, posts, ways, frame, etc. For a full description, with engraving, see Scientific American, Vol, 11, page 28.

Clocks.

John Robinson, of Washington, D. C., makes a fine display of Clocks, which attract much attention.

Portable Staging.

Goodman & Morris, Springtown, Ind., exhibit their patent Staging for builders, painters, etc. The arrangement is such that one man can raise or lower, with ease, the whole staging, which may extend across the entire front of the building. Illustrated and described in the Scientific American, Vol. 10, page 340.

Carriage Springs.

Wm. Wright & Co., of Newark, N. J., exhibit Murgatroyd's patent Carriage Springs, which are alleged to be cheaper, easier, and more durable than others. Their construction is peculiar. The invention has been before described in our paper.

Portable Gas Apparatuses.

J. W. Smith, exhibits his improved apparatus for making gas from oil and grease, and intended for family use. A small tube containing the oil passes through the fire of a common cooking stove. A gas receiver or reservoir is the only additional fixture.

Messrs. Choate & Tyler, whose residence we did not learn, exhibit a novel apparatus for making gas from wood. By a simple and ingenious arrangement they mix hydrogen gas, obtained from water, with the gaseous products derived from the wood, and thus prevent the formation of tarry liquids—heretofore a great objection. They obtain a larger amount of illuminating gas from a given quantity of wood than by other processes. The hydrogen is obtained by passing the water, in the form of steam, over bits of iron, such as nails; the oxygen unites with the iron, setting free the hydrogen. The light produced by this apparatus appeared to us to surpass in brilliancy that of the common coal gas. Price $75.

Dr. McConnell, of Washington, exhibits his patented wood gas apparatus. This is a simple arrangement of parts. The chief feature is in re-heating the gas after it has been generated. The light is good, and the apparatus simple and portable. Price $50.

Metal Cutters.

S. P. Ruggles, of Boston, Mass., exhibits one of his large machines for cutting sheet metal. It is ultimately destined, we were informed, for use in the U. S. Navy Yard, Washington.

Ambrotypes, Photographs, &c.

J. H. Whitehurst, also *N. S. Bennett*, of Washington, exhibit elegant specimens.

Alcohol Cooking Stove.

Thos. G. Clinton, of Washington, exhibits a neat and compact Alcohol Stove, by which the ordinary cooking of a small family can be quickly and economically done. It is a gem. For engraving and description see Scientific American, January 17, 1857.

Window Lock.

Alfred Speer, of New York, exhibits his patent Window Lock and Weather Strip. It forms a secure lock for the window, and at the same time excludes dust and water. Illustrated in the Scientific American, Vol. 11, page 96.

Ornamental Painting.

M. T. Parker, of Washington, exhibits some elegant specimens of architectural painting, lettering, etc.

Our limited space compels us to close this report without noticing many other valuable inventions and specimens which came under our notice.

We congratulate the Metropolitan Institute upon the success of this exhibition. The attendance of the public has been very large. The Managers and the Superintendent have been untiring in their efforts to give satisfaction. Their labor has not been in vain. The exhibition was to terminate March 31st.

Explosion of the Locomotive Hecla.—Its Construction.

American locomotives on American railroads generally carry an American pressure of steam; but all the parts being strong and well-proportioned, explosions or other casualties due to excessive pressure, are probably as rare in this as in any other country, in proportion to the number of locomotives in use. In Great Britain and France sixty pounds is considered a fair working pressure, while with us 90 pounds is supposed to be very weak, 100 tolerable, and 110 to 120 that at which the safety valves ought to blow off. We have ridden for hours on a locomotive at 144 lbs. pressure, by an accurate gauge attached, and as, under these circumstances, the valves absolutely refused to be confined down by the ordinary means, the very characteristic expedient was resorted to of letting one man climb up and *sit on the levers*. The (extraordinary !) engineering skill thus displayed was rewarded by a successful accomplishment of the task required. The innocent machine, one of the best and most powerful that ever screamed defiance on a track, drove onward, and received, as it should, the highest econiums as one equal to any emergency; and although we will not attempt to justify such pressures in general, or even in the occurrence of any however rare contingency, we then considered, and still believe that the danger was far less than frequently endured without a thought of risk in operating with old and corroded apparatus. Boilers weaken by use, and it is frequently impossible to determine where or to how great an extent the contortion and destruction of the plates or of the almost equally vital *stays* have taken place. We have great faith in new sound boilers, made of American charcoal iron, skillfully and judiciously designed, and carefully and faithfully put together.

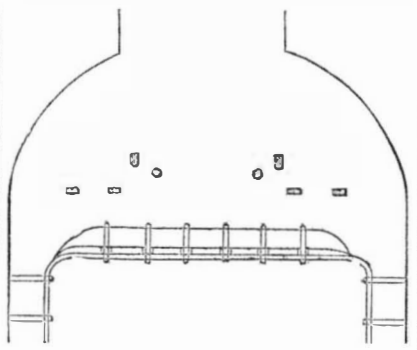
Boilers on our western rivers are worked regularly at pressures of from 100 to 250 lbs., and whenever the proportions are such as to secure a proper degree of safety, the advantages accruing are obvious, as there is not only more power in a small space and weight, but actually greater *economy* in the use of fuel with the employment of high than of lower pressure steam, all other things being equal.

These paragraphs, which have become a dissertation on pressure, were intended merely as introductory to a notice of the construction of the crown of the furnace of the locomotive which exploded at Framingham, on the Boston and Worcester and railroad a few weeks ago, condensed from an able article in the American *Railway Times* of the 5th inst.

The *Hecla* was built in 1848, and made since 1855, the subject of a long and severe experiment in coal burning. It was changed back to the employment of wood fuel, and finally exploded with an unknown pressure of steam, the rupture evidently commencing at the fire-box, and throwing the whole machine off the track about twenty feet, instantly killing the engineer, and badly injuring the fireman. The writer comments on the card of the President of the road, and insists that a corporation should, in such a case, do something more than merely *permit* an investigation.

Every prudent mechanic who is dissuaded from driving an engine by his want of confidence in the boiler, leaves the corporation to the mercy of the reckless. It ought to turn the calamity into a benefit, and instead of *permitting* an investigation, *summon* a jury of the best scientific minds in this line of inquiry on the continent, and hold an inquest for its own sake. Such an inquiry, if it cost a few hundred dollars, resulting in a safer construction of boilers, would inspire a confidence worth many times as much. It would pay in preventing future disasters, and the enhanced revenue that would result from a greater feeling of safety in the public, would be clear profit.

"We are ready," the writer proceeds, "to stake any reputation we may have, on the assertion that the immediate cause of the 'accident' was a want of that stability which might easily have been attained by a different construction. There is no evidence of the existence of any abnormal force, but only of an excess of force, and the fault of construction was such as to render it necessary that the crown-sheet of the fire-box should sooner or later fail to resist the maximum of working force. That the point of difficulty may appear, we give a diagram, which, without being drawn to an exact scale, will illustrate the mode of staying the crown of the fire-box in the *Hecla*. It is part of a perpendicular section through one of the stay-bars under the dome, and shows the precise mode of ap-



plying the bars. The semi-cylindrical shell over the fire-box being tied at its base *only by the crown-sheet itself* and the upper tier of stays through the water-leg, quite below the bend of the sheet, the outward pressure tends to depress the crown-sheet by opening the the arch. Thus, at each end of the unyielding bridge, its continuity with the abutment is to be maintained by a semi-arch, overloaded at its head, and tripped up at its foot. Is it not obvious enough, without resort to any transcendental mathematics, that there is a fearfully weak spot between the ends of these *beaked* stay-bars and the side wall of the water-leg? If these powerful stay-bars, instead of stopping, as on a close examination we find they did, *one inch and five-eighths* short of the insid perpendicular wall of the fire-box, had extended over the curve into the water-leg as low as the first tier of stay-bolts, and had a bearing there, they would have tended strongly to maintain the form of the arch, as well as to tie more strongly the hemi-cylinder at the weak line, its base. Not so extending, it seems to us the next best thing, and an indispensible thing, was to tie them up to the cylindrical surface above. This was done over a portion of the crown, and this was what saved that from sharing the same fate with the front part of the fire-box.

There can be no doubt, whether a crack existed previously or not, that the weakening of the crown-sheet by a line of rivets, aggravated the difficulty at the sides, and tended to hasten the catastrophe. The indentations under the *beaks* of those stay-bars which still remain connected with the crown-sheet of the extension, indicate that the sheet did not part at the rivets till the crack had begun to take effect, or, in other words, till the crown had settled considerably. The entire whiteness of the ragged fracture on the sides is quite inconsistent with the supposition of such a temperature as much have existed if the explosion had arisen from a deficiency of water. From the various recorded experiments on the resistance of iron, it seems to us very probable and natural that iron 11-32 of an inch thick—and by our measurement this was hardly 10-32—should give way to a pressure of probably more than one hundred tuns, all taking effect at the ends of these stay-bars, the whole system of bars operating in fact like a great punch, with at least a portion of the edge pretty sharp. So far from being mysterious, this punching through of the crown-sheet seems the most natural and inevitable thing in the world, and we should not be much astonished to see large punches made to operate by direct steam on the very principle of this so-called *staying*. That we are far enough from being wild in this view of the cause of the explosion we might prove by referring to several cases on record. It will be sufficient now to refer to the explosion of the *Irk* engine on the Manchester and Leeds railway, in 1844. In that case the stay-bars were not tied up, and all went down with the crown-sheet like a trapdoor on its hinges.

The main differences from the case of the *Hecla* were that the bars ran longitudinally, and that the bars of the *Irk* had the advantage of flat-bearing at the ends instead of being *beaked* like the *Hecla's*. In other respects, the conditions were precisely similar. The *Irk* was projected upward thirty feet, and the explosion was fatal to the engineer. The coroner's jury found a verdict of £500 against the company, and would have found one for manslaughter if the coroner had allowed it! A gentleman whom Herapath's *Journal* endorses as 'one of the ablest judges of a locomotive perhaps in England,' wrote to that journal in regard to this 'accident' :—

'It was certainly a defect *not to make the bars long enough* for their ends to rest upon the extreme angle, and accordingly this angle has proved to be the weakest part.'

It is quite true that this writer proceeds to say: 'But this fact is not sufficient to account for the explosion, which, if I may hazard an opinion, is only to be explained on the assumption of an excessive pressure of steam in the boiler.'

So we say in regard to the *Hecla*. The mal-construction is not sufficient to account for the 'accident' without assuming considerably more than the ordinary pressure. But it is not at all mysterious that there should have been such a pressure, for one of the safety valves which was not blown off, was found screwed down to such an extent that it must have been of little effect, and the other was probably in a similar condition. While standing still the boiler made steam much faster than the valves could dispose of it, so that the pressure doubtless rose to a point where the mal-construction gave it relief. There was strength enough to resist ordinary, but not to resist excessive pressure. Boilers may be made to resist greater pressure than that which destroyed the *Hecla's*. We must make up our minds to have such boilers, safe at a pressure of four or five hundred pounds to the inch, or else we must make an entire revolution in safety valves and their management."

H. L. S., of Mich.—Gilt letters are made on glass by first laying on a coat of size or varnish on the glass, allowing it to dry partially, then putting on gold leaf to form the characters. To make such letters stand exposure to the weather, they should receive a thin coating of copal varnish. Tar ointment can be removed from cotton by rubbing it first with warm butter or lard; then washing it in strong soap suds.

J. H. P., of N. Y.—We are not acquainted with any substance which can be added to glue to render it waterproof, and make it dry quick, and at the same time retain its adhesive qualities. Jeffrey, Walsh & Co., of Limehouse, England, manufacture great quantities of Jeffrey's Marine Glue, which is so far waterproof that it is used with great success in gluing together parts of masts and even of decks. The composition of marine glue is given on page 8 of vol. 7.

J. T. W., of Pa.—The sale of a machine previous to the application for a patent will not prevent you from obtaining a valid patent.

C. C., of Pa.—You had better not attempt to make an application for a patent on your alleged perpetual motion. It is a visionary scheme you may depend upon it.

L. H. W., of Wis.—The Franklin Journal is published monthly by the Franklin Institute of Philadelphia Terms $5 per annum. It is a very respectable and useful journal.

C. N., of Pa.—Superfluous hair can be removed by the use of chemical agents, but not without injury to the skin. Such experiments should be practised, if at all, with the utmost caution.

Benj. Mackerley, of Bainbridge, Ohio, wishes to be remembered to some manufacturer of zinc tubing, and would be pleased to open a correspondence in regard to making a purchase.

W. E. L, of Ohio—We are unable to inform you where the reports you want can be procured.

Thomas Carbine, of Chicago, Ill., wishes to procure a machine for making matches.

S. P., of Conn.—The best fluid to temper springs tha we know of is common oil. The car springs, and every other that we are familiar with, manufactured in this city, are thus prepared.

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H. W. M., of Pa.—Perpetual motion would not be pa. tentable, but only the means by which it was attained. We do not believe the centrifugal battery for throwing balls will do what is claimed for it, and doubt its actual xistence in practice. See notices to correspondents last week also.

F. D., of N. Y.—The increased bulk and weight in the vessels would defeat the practicability of covering the Atlantic cable with any substance either to strengthen or buoy it. In fact, we esteem it impossible to add any material which would buoy it permanently, as the water would gradually penetrate the pores. Any buoyant mat ter, whether enveloping the whole cable or attached at short intervals would relieve the cable of strain by retarding its descent in the water, but such matter would overload the vessels employed to lay the cable.

M. D., of Ind.—Your water engine to work by alternately filling and emptying reservoirs on the extremities of a long lever is old and bad. It is only allowable in some particular uses, as in working a pump, but the power is too slow and unsteady for producing rotary motion. You have displayed good e ngineering—that is all—in arranging the valves.

C. F. D., of Penn.—A small quantity of alcohol in ink tends to prevent it from freezing, but it makes it flow rather too freely, and liable to blot the paper. When you find your ink positively injured by freezing, (good for nothing as you state,) subject it to the action of boiling for fifteen minutes, and you will find it restored almost to its original condition.

T. B., of Ky.—Galvanized sheet iron is more durable by far than painted sheet iron; but you state that the roofing which you intend to put on is "No. 24 common cast iron." We know of no such material, but any kind of cast iron will endure as long unprotected as galvanized wrought iron.

A. P. W., of Ill.—Your communication is too long. The only way to prove the superiority of one kind of food over another would be to present correct statistics of the effects of different kinds of food. Such statistics would be really valuabl .

W. H., of Ill.—The elementery gases of water when burned on a piece of chalk produce an intense bright light—(the well known Drummond light). They will remain in a state of gas in a vessel for any length of time without chemical combination; but the presence of a piece of spongy platinum, or the electric spark passed through them will cause their chemical union, generating great heat, and liability to an explosion. Free oxygen gas combines readily with the iron of any vessel in which it may be contained, especially wrought iron. Oxygen and hydrogen gases in proper proportions to form water are dangerous to experiment with from their liability to explode.

F. N. B., of Wis.—Steam of 270 degrees temperature exerts a pressure of 41 pounds per square inch. About a pint of camphene will dissolve a pound of india rubber; the latter must be cut into fine shreds, and the ingredients kept warm in a close vessel.

W. M. & Co., of Wis.—The apparatus of Weissenborn illustrated in the last volume of the Sci. Am., is the best with which which we are acquaint d for purifying the feed water of steam boilers. We have known several cases where it has completely cleaned the interior of crusted boilers. Address E. W. Sargent, 17 Broadway, this city, for further information.

R. W., of Mich.—By fusing silver and copper in a crucible mixed with saltpeter, freely exposed to the atmosphere, the copper will be volatilized, and the silver remain behind. The copper passes off in green fumes, which will indicate to you where it is all separated from the silver The silver will be obtained pure by washing away the potash left behind. This is the dry process, and is somewhat tedious to execute.

C. G., of Mass.—It is very probable that your process for restoring cast steel is new and patentable; but before we can undertake to advise you in reference to it, we must have a complete account of the process—how it is conducted, &c.

H. H. M., of Ill.—Agreeably to your request, we have placed to your credit at the Patent Office $60, and charged the amount to your account.

A. H. T., of N. Y.—The London Artizan will answer your purpose, we think, as well as any other publication. C. H. Haswell, this city, is the agent. It is one of the best mechanical serials published.

D. M. P., of Texas.—We should judge that, as you suggest, blue spectacles would convert the yellow rays of artificial light into a green tint, more agreeable and less irritating to weak or sore eyes, but there is no absolute criterion on such points equal to experience. One of the editors, the writer of this, whose eyes have been too weak for any close application in the evening for several years, finds no aid in the use of glasses of any kind in the day-time.

R. C. O., of Wis.—"Can the patentee of a turning lathe exclude another from selling turned articles done by such machine, provided he buys a lathe of the patentee?" He cannot; a patent does not cover both the product and the machine. You have a perfect right to sel the turned articles in any State or territory wherever you can find a purchaser.

C. O. Read, of Perth Amboy, N. J, desires to correspond with some party who manu factures a good self-acting farm gate.

J. B., of Wis.—Boiled linseed oil thinned with turpentine is employed for making oiled silk. It is put on with a brush, or the silk may be dipped into it, and afterwards dried in the open air. This is also the best varnish or coating for balloons. It soon dries, is elastic, and not "sticky."

J. A., of Conn.—The grooves in rifle barrels might be made by "eating" them with sulphuric acid and the use of an interior slotted tube, the acid being poured between it and the barrel. The grooves thus made, however, would not be so accurate as those cut by the mode in common use, because the metal is not uniform in its texture, and the acid must act unequally upon it.

W. B. F., of Iowa—There are corn planters capable of dropping the seed so that it can be plowed at right angles.

J. W. E. S., of Pa.—There is no "greatly increased danger of explosion" where a pipe from a steam boiler passes through the fire for the purpose of super-heating the steam; but the pipe is liable to burn out, or become rotten and warped. The best method of producing "stame" is to lead the pipe from the boiler, not through the furnace itself, but through the flues or the stack, and provide such length of the pipe in this moderately heated atmosphere, that the steam will be heated sufficiently without heating the metal very intensely.

C. A. W., of Iowa—There is no late work upon millwrighting that we can recommend.

J. M., of Ala.—Water a little limy can be used for a boiler as to make no scale. To this end it is only necessary to heat the water, and allow the scale to deposit on something before it is admitted.

W. R. P., of L. I.—We can do nothing with ten pages of closely written manuscript on any subject, except to condense it. If you will forward us about two pages on the relations of the Chinese potato to Azote, we would be happy to entertain it.

B. S. H., of N. C.—We cannot dictate "what distance below the centers of wheels, seven feet in diameter, the shafts should be placed so that a horse can pull a heavy load with the greatest ease." The problem is too general. Always let the traces or draw straps incline so they shall lift as much as possible on the load—that is, attach them to as low a point as practicable, and as near as may be without touching his heels. We cannot recommend any work on house carpentry or blacksmithing.

J. A., of N. Y.—In our opinion the gas company certainly is the loser by supplying the gas at an excessive pressure, as the actual quantity of gas in a cubic foot at a high pressure is greater than that in a cubic foot at a low pressure, although its volume is the same. The meter measures the volume independently of its pressure or density.

E. T., of Ohio.—We like Aubin's patent apparatus for making gas from rosin, or rather rosin oil. Inform us how it pleases you after a trial.

Money received at the Scientific American Office on account of Patent Office business for the week ending Saturday, March 28, 1857:—

L. F., of Mass., $30; W. E., of Ill., $30; I. N. W., of Ill., $30; F. T., of Mass., $25; J. S., of O., $30; A. E. M., of N. Y., $30; J. D. M., of Conn., $30; S. J. S , of N. Y., $15; C. Van B., of N. J., $25; C. C. S., of N. Y., $30; L. T., of Ala., $30; E. F. B. E. of La., $30; A. S., of——, $25; H. S., of Va., $25; T. S. W., of N. Y., $30; P. C., of Conn., $25; C. R., of O., $25; E. G. C., of N. Y., $25; R. W. T., of Conn., $25; J. E., of N. Y., $55; S. S. Mfg. Co., of Conn., $30; L. W., of Mas., $30 D. S. D., of N. Y., $10; S. J. B., of N. Y., $100; C P., of N. Y., $20; H. A. D., of Pa., $30; W. D. F., of Conn., $25; J. O'B., of N. Y., $27; C. W., of N. J., $30; L. M., of N. Y., $20; E. N., of N. Y., $75; J. P. G., of N. Y., $55; T. B. DeF., of Conn., $50

Specifications and drawings belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, March 28, 1857:

J. O'B., of N, Y.; J. H., of Conn.; J. D. S., of Vt.; F. T., of Mass.; C. J., of Conn.; R. W. T., of Conn.; E. G. C., of N. Y.; C. R., of Ohio; G. & F., of N. Y.; H. S., of Va.; C. W., of N. J.; C. Van B., of N. J.; J. W., of Eng.; J. L., of Eng.; L. W., of N. Y.; R. B., of N. Y.; G. & D., of N. Y.; T. B. DeF., of Conn.; W. A. F., of Conn.

Literary Notices.

Graham's Elements of Chemistry.—After an interval of several years, Part 1, of Vol. 2, of the above named most excellent work, has been published by H. Ballierre, London, and No. 290 Broadway, this city, where the English edition can be obtained at $1 50. This edition is edited and revised by H. Watts, editor of the "Chemist," London. Fifteen of the metals are treated in this volume with brevity, yet with a completeness that affords evidence of Mr. Watts' ability to execute such a task in a superior manner.

Blackwood's Magazine.—The February number of this able magazine, just republished by Leonard Scott & Co., No. 50 Gold street, this city, contains part 9 of the "Athelings," "The War in Asia," and a number of other excellent essays. It is a good number.

Reigart's Life of Robert Fulton—We are occasionally asked for the price of this interesting book, and for the information of all we herewith annex them:—

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In calf,	3 50.
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NOTICE—To Inventors, Patentees, and Scientific Gentlemen.—H. BOEHMER would respectfully notify the above that he is prepared to manufacture and execute all orders for models or scientific instruments at the shortest notice, and on most reasonable terms. H. BOEHMER, 69 Fulton st, N. Y. 1*

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THE NEW YORK HALL OF ARTS is now open to receive contributions from all parts of the country for a permanent Free Exhibition. Inventors and others will send at once for a Circular, as it gives advantages never before obtained. Address I. S. CLOUGH, 594 Broadway, New York. R. D. GOODWIN, President. 29 3

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WANTED—Invention. Any one having a light and practical invention, wishing one experienced to financier, and work out the same, can address, stating nature of the invention, B. E. F., Box 2238, Post Office. 29 2*

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Science and Art.

Lowering Boats at Sea.

It is, in theory, very easy to lower a boat either empty or full of people, and after she is fairly in the water, to let those in the boat unhook the tackles at each end, and row away in safety, but it happens to be very difficult in practice in a heavy sea, and is very certain to fail in some fatal point when all are "looking out for number one" in leaving a foundering or a wrecked vessel. The two davit tackles must be lowered alike by different men, and unless both are very quickly and dexterously unhooked at about the same time the violence of the sea will be very certain to terminate the enterprise by the loss of the boat, and pretty nearly or quite all on board. The fact that some means are demanded of insuring greater safety is sufficiently obvious, and although we are not prepared fully to endorse the plan here illustrated, an English invention which we describe from the patent, and from a notice in the London *Mechanics' Magazine*, it certainly contains some admirable features, and it is presented as one which may perhaps serve to develope another, free from the objectionable windlass which here occupies so large a space.

The invention is worked chiefly by the novel application of a principle well known to all sailors—the "turn and a half" on a running rope; and it is a cause for surprise that a means so natural to all naval men, and so intimately familiar in every nautical operation, should not long since have been brought to bear. It is the result of labor and experiment extended over the last five years. The well known arrangement just alluded to for regulating strain, is obtained by coiling a rope round a fixed object, and then holding on—the friction caused by the tension of the rope creating a power of control termed a "dead nip," as at a steamboat pier, one man, by taking a few turns of the rope round the stout pile, makes his own weight at one end of it an equipoise to the pull of the steamer upon it. A block effecting the same object, but with the rope passing over movable sheaves instead of fixed surfaces, and thus making a "turn and a half on a live nip," figs. 1 and 2, without wearing the rope, is the leading novelty of the present invention. The great stumbling blocks to success hitherto in lowering boats have been, the want of control when lowering a heavily laden boat with the direct purchase of a single rope, and the fact that the various processes of unlashing, lowering, and disengaging have been the divided duties of men separated, some in the boat and some in the ship, any error through inadvertancy or accident on the part of either producing failure, and too often fatal consequences. Here they are all done from the boat by one only of the boat's crew, whose simple strength, irrespective of any additional assistance whatever, is made to hold in equilibrium the descending momentum of the boat with its entire crew, which he has thus the power to control it at will. Each separate operation is the natural consequence of one act (slacking of a rope), and they are all necessary sequents one of the other.

The means of reducing the weight of the boat to that of the man lowering is also made the means for preventing the boat canting in its descent, and the passage of the ropes by which the boat descends, through the block of an entirely novel character and action, accomplishes this end.

Mr. Clifford hoists boats up with the usual tackles or pendants to the davits, his apparatus being solely employed to unlash lower, and disengage them. The means of unlashing are admirable, and entirely do away with any necessity for attending to that portion of the operation when the boat is wanted suddenly.

The instruments he uses are the ordinary ships' gripes, or pieces of rope of equal length, which are divided into two parts, *i i*, fig. 2, in both ends of which, thimbles, *k k*, are placed, and the two pieces are held together by a lanyard, *m*. These two pieces being passed round the boat, one above and the other below, and the thimbles, *k k*, passed up the prongs on the davit, *o o*, are hauled tightly together at *m* by the lanyard, which is then fastened to the boat's thwart. The gripe now clasps the boat all round, holding it firmly to the ship's side by means of the thimbles, *k k*, at the points, *o o*, and when the boat is wanted in a hurry, the thimbles slip down the prongs, and the boat at once is free without the gripes being touched.

There are two blocks of a peculiar construction, invented by himself. These blocks have attached to the boat near each end three sheaves, not placed side by side as in an ordinary three-fold block, but one below the other in a straight line, and in the same plane. There is also a cylinder or barrel, turning on an axis, fixed athwart the boat amidships, and at right angles to her sides, and immediately below the central thwart. These are represented by two leading single blocks secured to eye-bolts in the keel, at the same distance apart as the davits are to which the boat is hoisted up.

The ropes, *c* and *d*, by which the boats are suspended and lowered are secured firmly at one end to the davits, and are rove successively through the blocks, *f* and *h*, and then inserted loosely in the holes in the windlass, *a*. These ropes are termed by the patentee "lowering pennants."

"The blocks, *f*, have an eye-bolt on each cheek, to which short pendants are spliced, and the other ends of which, fastened to eye-bolts in the boat's side, form slings or lifts, *g*, and prevent any possibility of the boat's canting. The cylinder or barrel, *a*, is furnished with a rope, secured to it at one end near the side of the boat, and which we shall call a winding-rope. its action being to regulate the revolutions of the barrel, and to wind and unwind the lowering pendants on it. This rope, by the act of lowering, is wound on to one end of the barrel as the lowering pendants run off from the centre. It must be somewhat longer than the hight of the boat from the water when hoisted up. Hauling on it reeves the two lowering pendants equally, and slacking it off, unreeves them alike by allowing the barrel to turn, insuring not only a descent on an even keel, but the release of each end of the boat at the same moment. The block, *f*, has this peculiarity, that when a rope is rove between the upper and middle, and the middle and lower sheaves, it will pass freely between them, and round the center sheave when slack, but will nip all the sheaves when tightened (without chafing the rope), thereby enabling a person having control of the rope to have perfect command over any weight either attached to the rope if the block be fixed, and the block allowed to traverse on it, which latter is the case in the operation of lowering a boat on Mr. Clifford's plan. The resistance of this block to the free passage of the rope through it is regulated by the relative positions of the sheaves to each other and the space between them, greater space giving freer action to the passage of the rope, but less power, consequently. Now, while it is required in lowering ships' boats to obtain such power as will enable one man lowering by the winding rope to have perfect control over the descending weight of the boat, it is of equal importance that all resistance to the free run of the lowering pendants should cease with the necessity for it; and both these important ends are insured by the block on the proportions represented.

CLIFFORD'S METHOD OF LOWERING BOATS.

Fig. 1

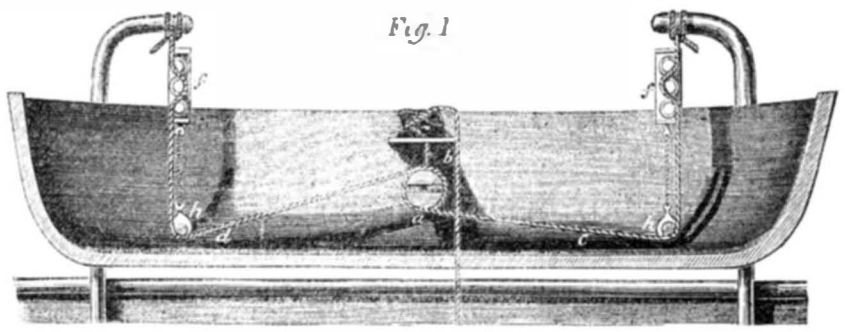

Fig. 3

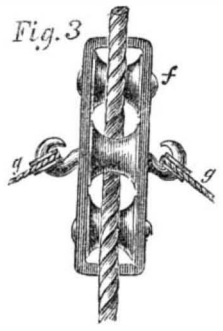

Fig. 2

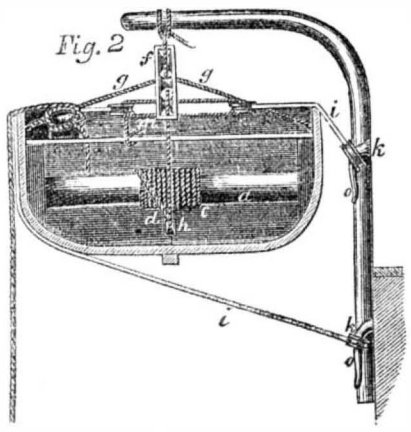

Fig. 4

The favorable reports received from all the officers appointed by the Admiralty to test this plan, have led to instructions being given to the inventor to teach the mode of fitting to the various artizans in the Government dockyards, and boats are now being fitted at Woolwich, Portsmouth, Sheerness, and Devonport, under the authority of competent officers of each establishment, with a view to the general adoption of the system throughout the service. Similar reports from their officers have induced its compulsory use in all emigrant ships by order of the Emigration Commissioners, and their example has been followed by some of our principal mercantile firms and large steam companies.

Public notice was first drawn to this invention, through the Institution of Civil Engineers, where it was exhibited before a meeting of naval men and engineers in 1855, on which occasion it received the strongest expression of approval from Edredge, the unfortunate commander of the missing *Pacific*. Subsequently, it was brought officially before the Surveyor of Lloyd's Registry for British and Foreign Shipping, who reported on it most favorably to the committee of that important body, since which time its practical utility has gradually led to its extended use. The course adopted by her Majesty's Emigration Commissioners in causing trials to be made specially with this against other plans, under their chief officers at the different ports, has done far more than anything besides to fix public attention upon it. The necessity for the compulsory adoption of an improved system in all ships has been long and painfully evident, and the supineness of naval authorities, and the perfect indifference of proprietors to avail themselves of any improvements which would give at once a sense of security, and a means of escape to crews and passengers in times of urgency, has been matter of public notoriety and comment, and led to the insertion of the stringent clause, by which masters of passenger vessels are rendered liable to penalties of from £5 to £50, for not "carrying certain boats in such a manner as to be, in the opinion of the Emigration Officer, most available for immediate service." This Act has, however, remained a dead letter until quite recently."

Sugar Gunpowder.

M. Bequerel and M. Lenorment, of Paris, —both distinguished as chemists—have recently produced detonating powder by dissolving loaf sugar in strong sulphuric acid, and then drying the product. It is stated to be as explosive as gun-cotton, but is not suitable for muskets or rifles, on account of its great rusting or oxydizing qualities.

Domes on Steam Boilers.

Boilers are considerably weakened by what is, in effect, *cutting large holes* in their upper surfaces by the addition of domes, but as no other equally efficient means has yet been devised for obtaining dry steam, it is important to know how far such serve to weaken the shell, and how the effect may best be obviated. The following. in point, we clip from the *Railroad Advocate* of the 21st ult. :—

"The weakness, from the alteration of form produced in steam boilers by the attachment of a steam done, is inversely as the difference of the diameters of the two parts. The greatest effect being when the dome and the boiler are of the same size. In such a case there is a large and comparatively flat surface on each side, which should be thoroughly stayed by bolts passing across from the one to the other. It has often occurred that boilers have given away from deficiency of staying in this part. The present practice appears to be in favor of small domes, seldom exceeding 30 inches diameter, leaving the opening into the boiler, through these, only large enough for a man-hole. The metal of the shell thus left serves as a good brace for the boiler, in addition to which there should be a flat brace, like the chord of an arc, on each side of this opening, and as long as can be got in the clear of the dome—and attached by three or four rivets at each end to the shell of the boiler. With boilers so stayed, no difficulty will be experienced from the use of the dome."

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